

U.S. Air Force Pollinator Conservation Reference Guide - Appendix A: Species maps and profiles



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2017

U.S. Air Force

Pollinator Conservation Reference Guide

Appendix A: Species maps and profiles

Prepared for

U.S. Air Force Civil Engineer Center

Prepared by

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ABBREVIATIONS AND TERMINOLOGY

AFB = Air Force Base
AFR = Air Force Range
AGFD = Arizona Game and Fish Department
ATV = all-terrain vehicle
Bivoltine = two generations per year
BLM = Bureau of Land Management
BoR = Bureau of Reclamation
CABI = Centre for Agriculture and Biosciences International
Caterpillar = larva of a butterfly, skipper or moth
Chrysalis = pupa of a butterfly, skipper or moth
Diapause = a dormant phase
DoD = Department of Defense
Eclose = emerge from a pupa
ECOS = Environmental Conservation Online System
ESBB = El Segundo blue butterfly
FR = Federal Register
FS (in text) or USFS(on maps)= Forest Service
Gynes = reproductive females
Half-life = estimated number of years until an additional 50% of the population is lost
Host plant = food plant for larval butterflies, skippers and moths
Instar = time between larval molts (larval stage)
LLNB = lesser long-nosed bat
NPS = National Park Service
Oviposit = lay an egg or multiple eggs
PIF = Partners in Flight
PIF Yellow Watch List = Bird species that have restricted ranges and small populations. These species require constant care and long-term assessment to prevent population declines.
Senesce = age and wither
Univoltine = one generation per year
USDA = U.S. Department of Agriculture
USFWS = U.S. Fish and Wildlife Service
VELB = valley elderberry longhorn beetle

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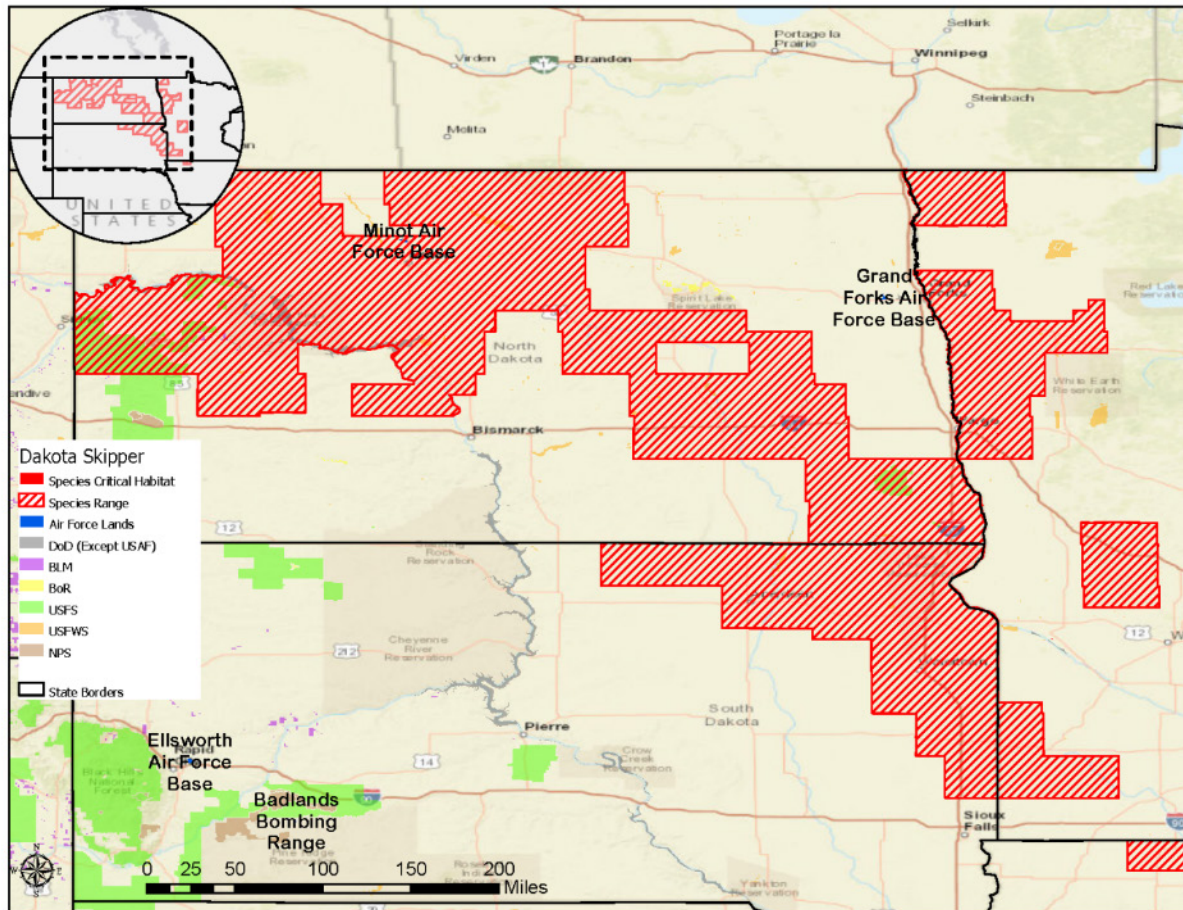
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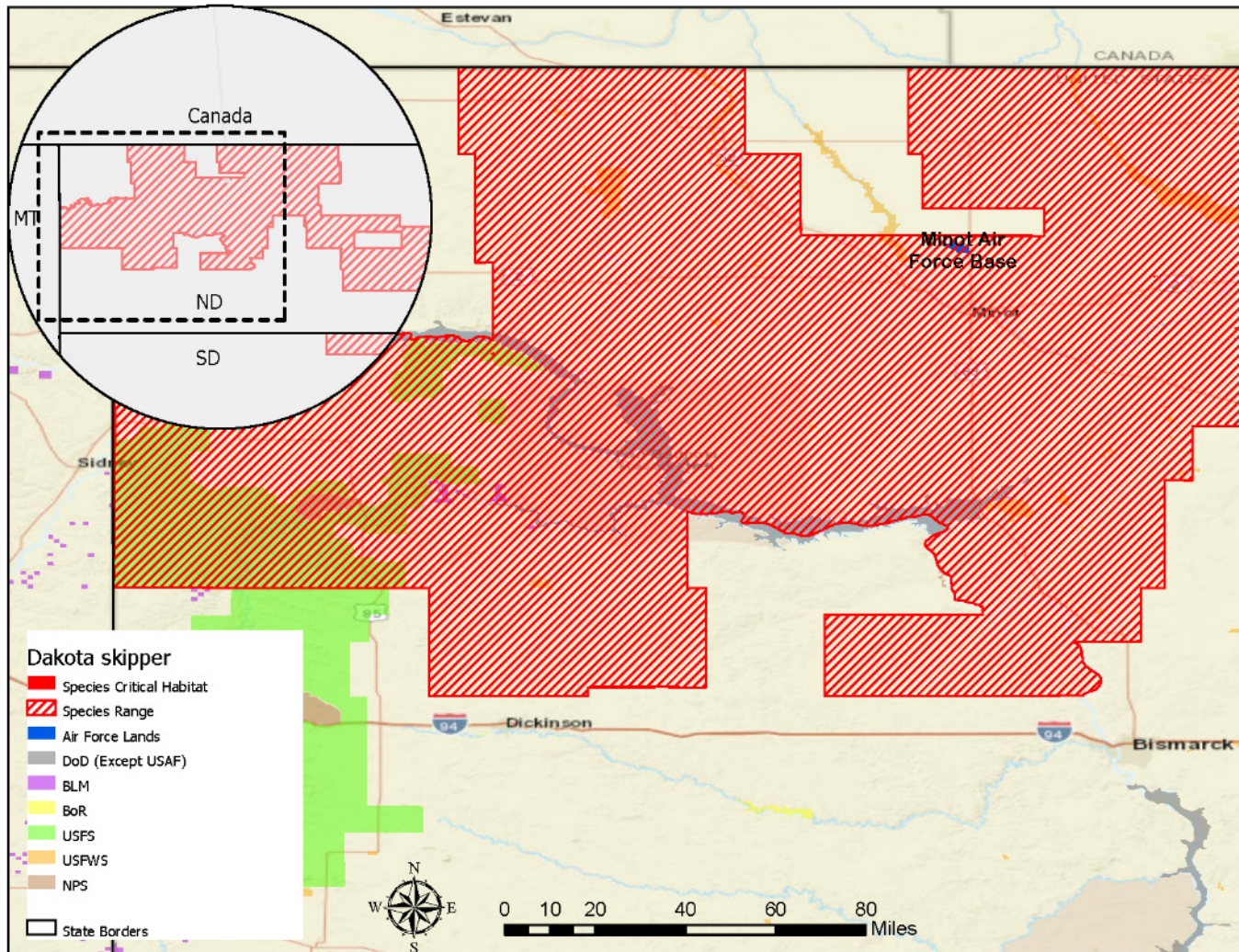
SECTION 1: ENDANGERED AND THREATENED POLLINATORS

SECTION 1. A. DAKOTA SKIPPER (*HESPERIA DACOTAE*)

1. A. 1. Full range map



1. A. 2. Focal area map



1. A. 3. Species profile



L to R: Male and female Dakota skipper (photo: Andrew Horton/USFWS)

Status: Threatened

Life cycle: The annual, single generation of adult Dakota skippers ecloses (emerges from pupae) from mid-June to early July, depending on the weather, with flights starting earlier farther west in the range. Males emerge as adults about five days earlier than females. The flight period in a locality lasts two to four weeks and mating occurs throughout this period, with females typically mated soon after emergence. The estimated potential adult life span was 3 weeks and average life span (or residence on site before death or emigration) was 3 to 10 days in one study in a Minnesota prairie. Eggs hatch after 7 to 20 days. Larvae (caterpillars) then crawl to the bases of grass plants where they form shelters at or below the ground surface with silk, fastened together with plant tissue. Each larva constructs two to three successively larger shelters as it grows. At night they emerge from their shelters to forage. Dakota skippers have six or seven larval instars (time between larval molts, or larval stages). They diapause (enter a dormant phase) overwinter in their ground level or subsurface shelters during either the fourth or fifth instar. The following spring, larvae resume feeding and undergo two additional molts (larval stages) before they pupate. During these last two instars, larvae shift from buried shelters to horizontal shelters at the soil surface.

Floral preferences/Adult food: Adult floral preference varies regionally and includes nectar from purple coneflower (*Echinacea angustifolia*), harebell (*Campanula rotundifolia*), white prairie-clover (*Dalea candida*), long-headed coneflower (*Ratibida columnifera*), fleabanes (*Erigeron spp.*), blanketflowers, black-eyed Susans (*Rudbeckia spp.*), and evening primrose (*Oenothera serrulata*).

Juvenile food: Larvae consume several grass species, little bluestem (*Schizachyrium scoparium*) may be a favored food source.

Habitat: Dakota skippers are obligate residents of high quality prairie ranging from wet-mesic tallgrass prairie to dry-mesic mixed grass prairie. They typically occupy remnant bluestem prairies characterized by a variety of composites (*Asteraceae*) and alkaline soils.

Nesting sites: None. Females lay eggs directly on grasses that the larvae eat, and sometimes lay eggs on broadleaf plants.

Breeding dates: Mid-June to early July depending on weather. Flights begin earlier in the farthest west of the range and during relatively warm years.

Overwintering sites: Larvae overwinter in ground level or subsurface shelters made of silk and leaves.

Threats: Threats include the conversion of habitat to non-grassland (via agriculture, mining, etc.), invasive species, pest control (insecticides), habitat fragmentation, and grazing, haying, or controlled burning that is carried out too intensively.

Management recommendations:

1. Protect, restore, and maintain high-quality prairie remnants within the species' range that includes host plants (food plants for larvae), and nectar sources for adults during their flight season.
2. Map Dakota skipper distribution at a fine scale within habitat prior to and following management.
3. Manage habitat with grazing, prescribed burns or haying to maintain grasses and nectar sources in a way that minimizes impacts to Dakota skipper.
4. When managing with prescribed burns:
 - a. Burn no more than one-third of the habitat at a time.
 - b. Allow at least three years between burns (= four year rotation).
 - c. Strive for patchy burns rather than complete burns (burning in cool, damp conditions may result in patchy burns).
 - d. Use early spring burns when possible.
5. When managing with haying:
 - a. Delay until after the adult flight season, or after grasses senesce (age and wither).
 - b. Set blade height at eight inches or more.
 - c. Avoid haying annually (rest fields).
6. When managing with grazing:
 - a. Avoid regimes that minimize floral diversity or density.
 - b. Rest the area at some point during the season.
 - c. Do not graze at the same time each year.
 - d. Do not use grazing to manage wet mesic prairie habitat in ND; use haying.
7. Avoid the use of pesticides in Dakota skipper habitat. Target applications with spot applications of herbicides if necessary for weed control.
8. Manage sites to minimize invasive species.
9. Connect isolated habitat patches and expand patch size to increase genetic diversity.

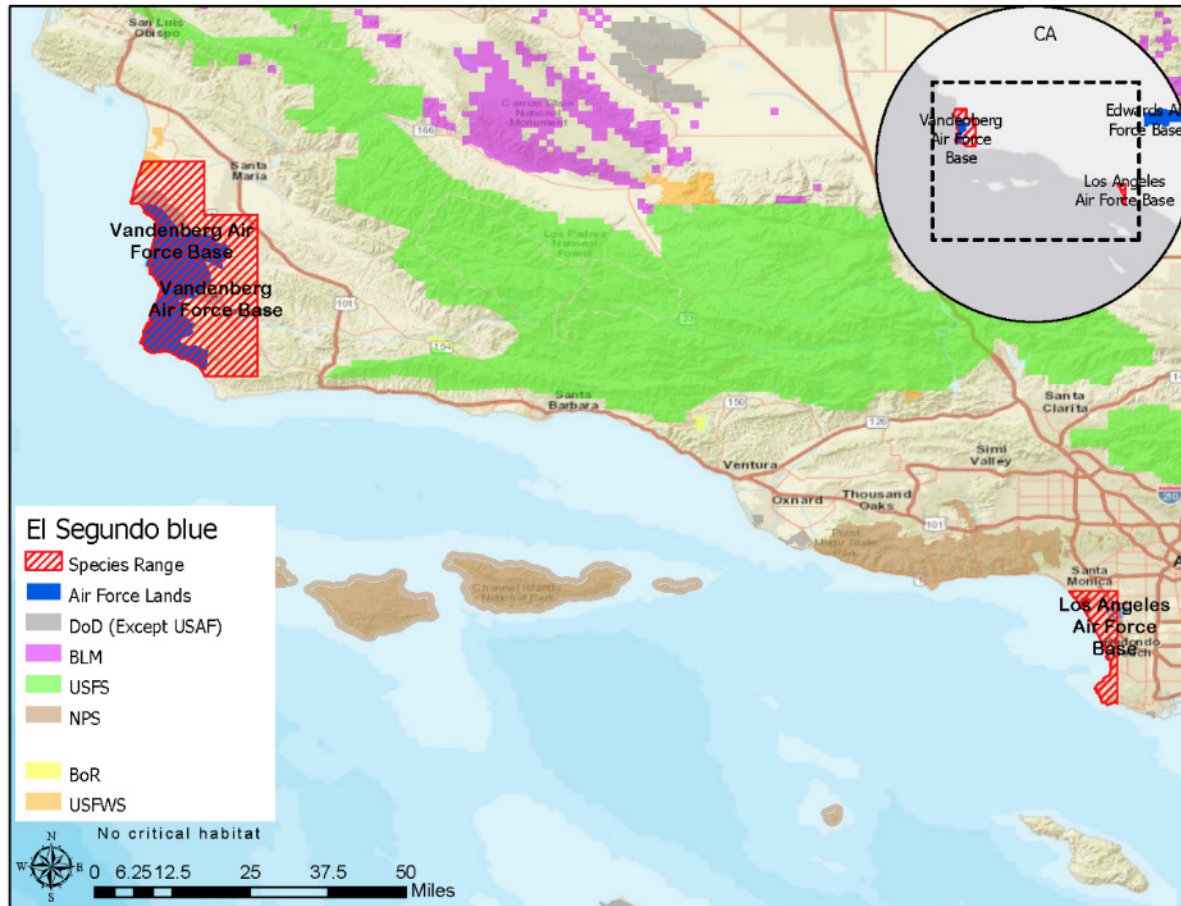
Additional information: The U.S. Fish and Wildlife's (USFWS's) *Dakota Skipper Section 7 Guidance* contains information for determining whether the Dakota skipper may occur in an area. In general, habitat is assessed to determine whether it contains the features essential for the Dakota skipper and then qualified biologists conduct surveys at the appropriate time and under appropriate conditions. USFWS maintains a geodatabase that contains survey records for the species that may be used to help determine whether the species may occur in a given area. For more information on surveying and management, see USFWS [*Dakota Skipper Conservation Guidelines*](#) and [*Dakota Skipper Section 7 Guidance*](#) at: <https://www.fws.gov/Midwest/Endangered/insects/dask/index.html>

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SECTION 1. B. EL SEGUNDO BLUE BUTTERFLY (*EUPHILOTES BATTOIDES ALLYNI*)

1. B. 1. Full range map



1. B. 2. Species profile



[El Segundo blue](#) (photo: Stonebird [CC BY-NC-SA 2.0](#))

Status: Endangered

Life cycle: The life cycle of the El Segundo blue butterfly (ESBB) is tied intimately to coast buckwheat (*Eriogonum parvifolium*) as survival of each of its four life stages (egg, larva, pupa, and adult) depend on this plant. The adult stage typically lasts from four days to two weeks. Adults normally begin flying in mid-June and continue until early September. Adults consume coast buckwheat pollen and nectar, and mate and lay eggs on coast buckwheat flowers. Eggs hatch within three to five days, and larvae undergo four instars prior to pupation.

Floral preferences: Coast buckwheat (*Eriogonum parvifolium*).

Adult food: Adults consume pollen and nectar of the coast buckwheat (*Eriogonum parvifolium*).

Juvenile food: Larvae feed primarily on buckwheat seeds while remaining concealed in the flower heads of the buckwheat.

Habitat: The ESBB range formerly extended over much of the 3,200 acre El Segundo Dunes of Los Angeles County, CA. The dunes ranged from Ocean Beach (near Santa Monica) south to Magala Cove in Palos Verdes and were bordered on the west by the Pacific Ocean and the east by Los Angeles coastal prairie. The ESBB occupied areas within the dunes with high sand content and its obligate host plant, coast buckwheat. The historic population size likely averaged 750,000 butterflies per year. The ESBB is endemic to coastal sand dunes and is now found in small dune ecosystems in Los Angeles County in six general areas extending from the Palos Verdes Peninsula near Point Vicente north to the Ballona Wetlands. Since listing ESBB resident occupancy has also been documented in seven areas in Santa Barbara County.

Nesting sites: None. Eggs are laid directly on buckwheat.

Breeding dates: June to September

Overwintering sites: Pupae hibernate in litter, sand or at base of leaf.

Threats: The Los Angeles coastal prairie has been entirely converted to an urban landscape and the dunes reduced to about 307 mostly degraded acres. The extent of habitat loss peaked, and ESBB likely reached their lowest numbers, in the late 1970s when virtually all of the dunes were developed or degraded. Restoration efforts were initiated in the 1980s and continue to this day. Virtually all remaining potential habitat in Los Angeles County was protected from private development due to geological, conservation and other restrictions by 1990, and is believed to be capable of supporting 100,000 butterflies if fully restored. Governmental development, especially by the City of Los Angeles and the Los Angeles International Airport is still a significant threat.

Management recommendations:

1. Removal of nonnative plants and re-establishment of native vegetation including coast buckwheat.
2. Restrict and/or limit use of pesticides in ESBB habitat, especially during breeding season.
3. Re-introduction of ESBB at identified low population sites.
4. Monitor and protect known ESBB sites and habitat.
5. Augment protected and managed areas.
6. Conduct standardized surveys.
7. Develop, implement and augment current outreach and educational programs.
8. Place signs every 50 feet along edge of any protected areas.

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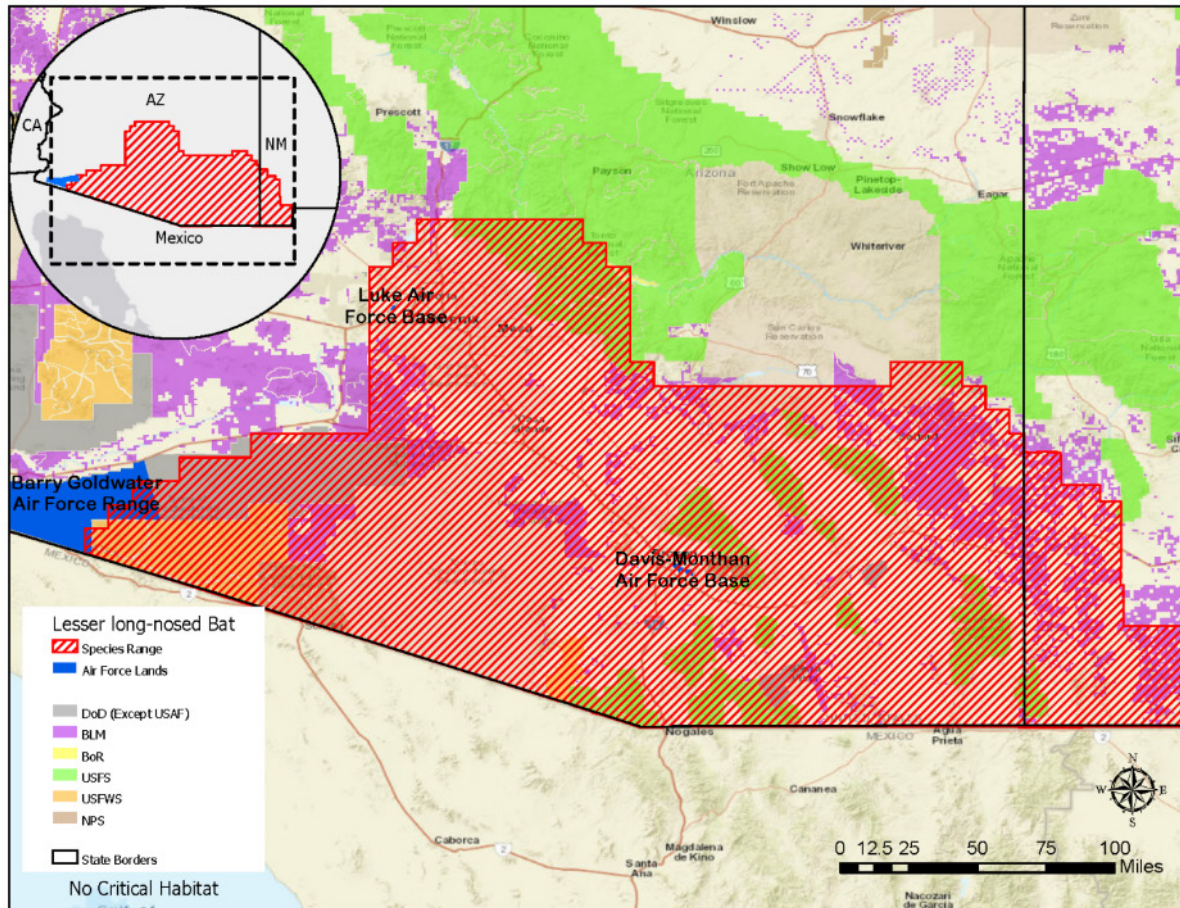
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SECTION 1. C. LESSER LONG-NOSED BAT (*LEPTONYCTERIS CURASOAE YERBABUENAE*)

1. C. 1. Full range map (United States only)



1. C. 2. Species profile



Lesser long-nosed bat (photo: Bill Radke/USFWS)

Status: Endangered¹

Life cycle: The lesser long-nosed bat (LLNB) is found throughout its historical range, from southern Arizona and extreme southwestern New Mexico, through most of Mexico. A portion of the population is migratory. Female lesser long-nosed bats migrate north, following the blooming flowers (nectar trail) in the spring, into southwestern Arizona and northern Mexico to give birth in maternity roosts. There is also a resident population segment that remains in central and southern Mexico. LLNBs move north and east to late summer roosts after the food resources around maternity roosts decline and the young are able to fly. Here, LLNBs feed on nectar held within agave blossoms until they migrate south to Mexico in October and November. LLNBs may either hover at or land on flowering stocks to feed. Some LLNBs may move north and east into New Mexico to forage on agaves before migrating south to Mexico in late fall.

Floral preferences: Agave and columnar cacti in the U.S. The LLNB also forages on a variety of flowering deciduous trees in Mexico.

Adult food: The large, white, aromatic flowers of columnar cacti are the primary food sources during the spring. LLNB will also forage on the fruits of these cacti. LLNBs feed on nectar and pollen from flowers of saguaro and organ pipe cactus in early summer and agave later in the summer and early fall. Although nectar, pollen, and insects are consumed, fruits are also eaten

¹ USFWS proposed delisting this species on January 6, 2017 (82 *FR* 1665); a final decision was not made prior to completion of this report.

when nectar is no longer available. LLNBs can be opportunistic feeders on hummingbird feeders, but it is unknown if this is in response to reduced natural food sources or simply a readily available food resource. It is unknown whether there are negative effects from using hummingbird feeders (i.e., the lack of nutritional value) or effects to seasonal migration patterns.

Juvenile food: Once weaned, juvenile food resources are the same as adults.

Habitat: Within the U.S., habitat types occupied by the LLNB include Sonoran Desert scrub, semidesert and plains grasslands, and oak and pine-oak woodlands. Habitats in Mexico include desert and grassland communities, thornscrub and tropical deciduous forests.

Nesting/Roosting sites: Maternity roosts are typically within caves that provide darkness and protection. The males tend to roost in different locations than the adult females and juveniles. Day roost sites include caves and abandoned mines. Night roosts are typically small caves and other structures such as buildings and bridges.

Breeding dates: Mating in both the migratory and resident population occurs in the winter and early spring in southern Mexico. Migratory females arrive in Arizona pregnant as early as the second week in April. Young can fly by the end of June. Maternity colonies break up by the end of July.

Overwintering sites: Resident and migratory lesser long-nosed bats winter in southern and central Mexico. They are typically in thornscrub and deciduous forest communities.

Migration dates: For the migratory segment of the population, bats arrive in Arizona in late April and return to Mexico in beginning in September, and on occasion as late as November.

Threats:

1. Excess harvesting of naturally occurring agaves in Mexico
2. Collection and destruction of cacti in the U.S.
3. Conversion of habitat for residential, agricultural, and livestock uses, including the introduction of invasive buffleggrass
4. Wood-cutting
5. Alternative energy development (wind and solar power)
6. Disturbance of caves and mines associated with illegal border activities and required law enforcement activities
7. Drought and climate change
8. Fires
9. Human disturbance at roost sites
10. Urban development.

Management recommendations:

1. Monitor and protect known and potential roosts within suitable habitat. Consider restrictions or closures to human access during all times when bats are present. Protecting maternity and mating roosts is most important.
2. Manage known and potential migratory corridors by planting native species including agave, replacing agaves lost, and reducing or removing invasive species.

3. Maintain expanses of suitable foraging habitat within 50 miles of known and potential roosts and/or within approximately 0.5 to 1.2 miles of large washes. Minimize foraging habitat fragmentation, plant native species including agave, and reduce or remove invasive species in these areas.
4. Develop and implement an education and outreach program on the LNNB and the importance of bats as pollinators.

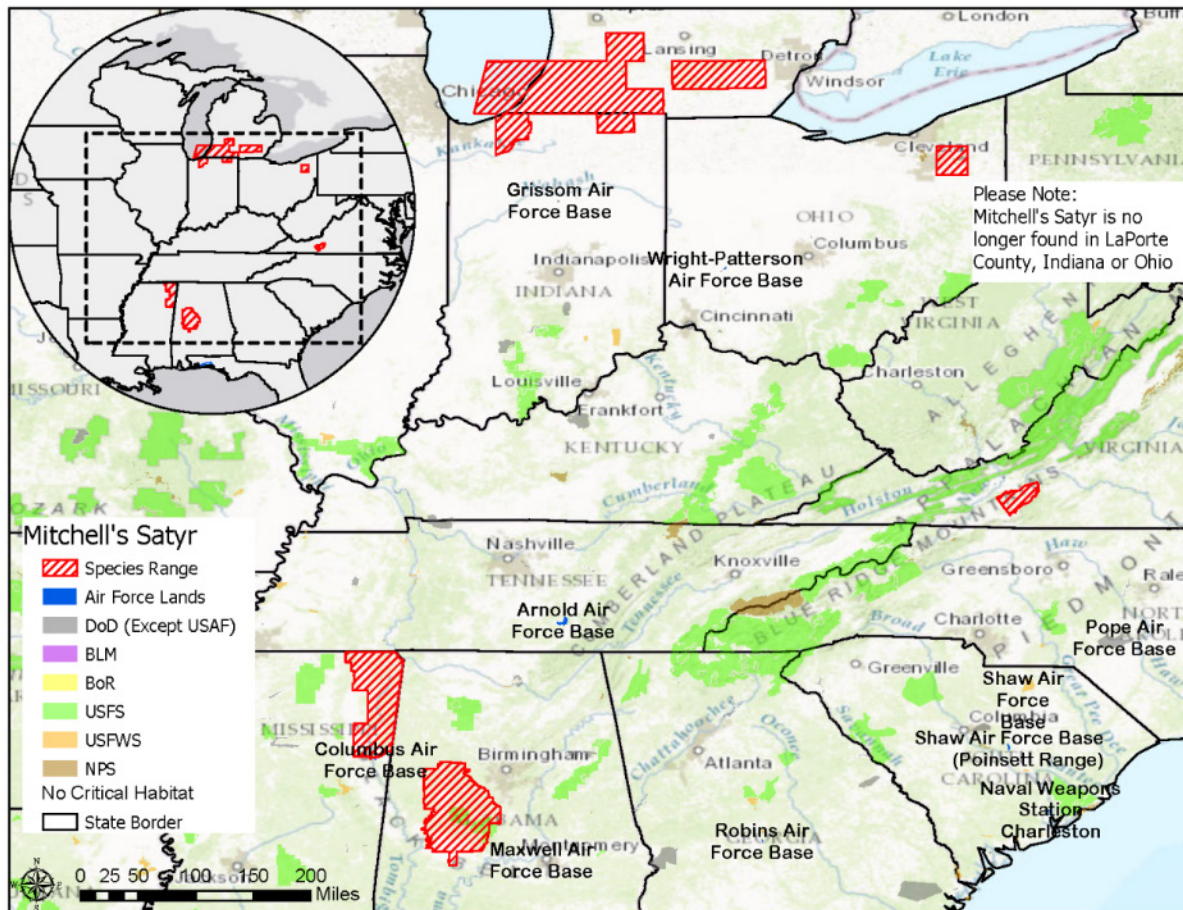
Additional information: Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. They are known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to foraging areas have been documented in excess of 100 miles

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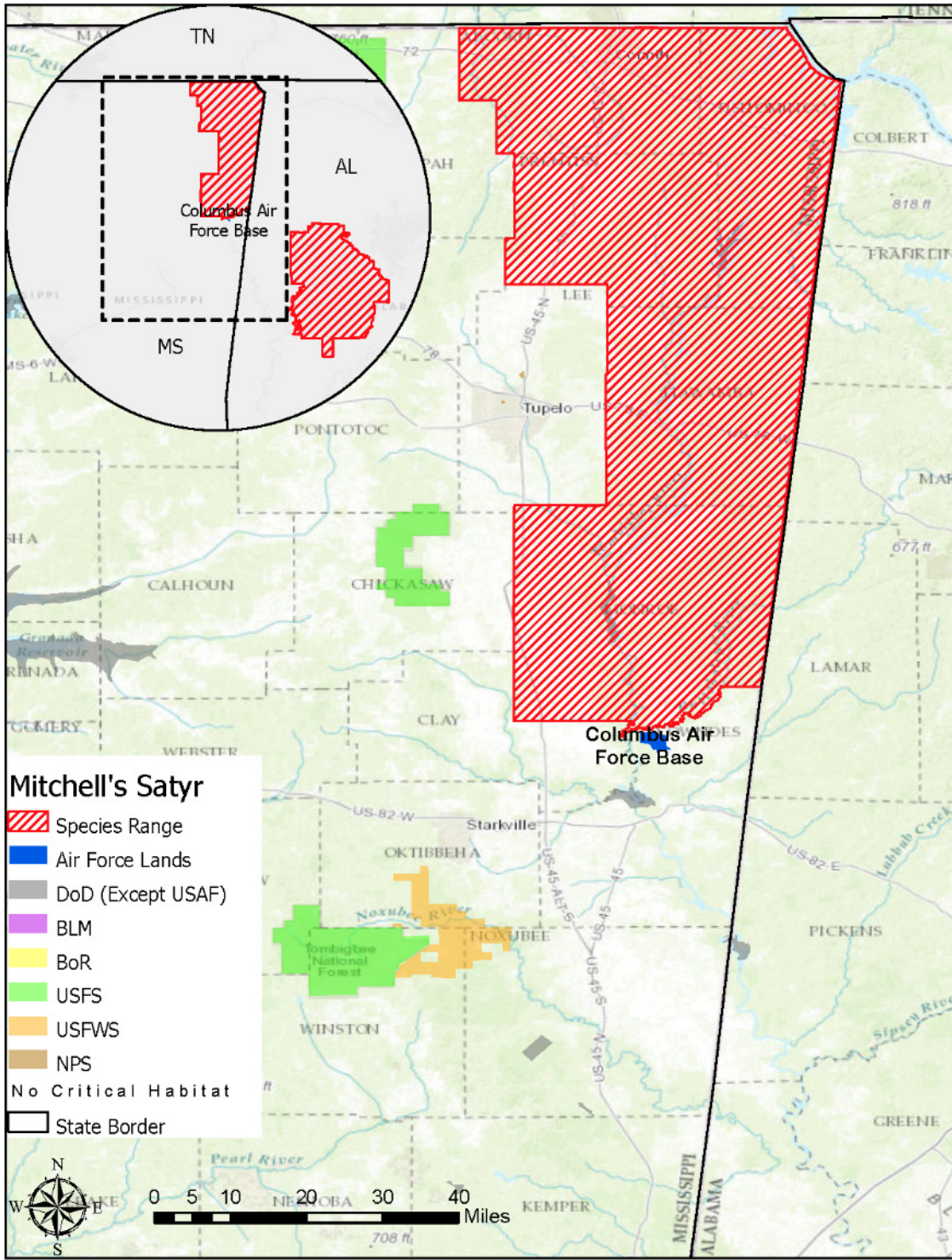
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SECTION 1. D. MITCHELL'S SATYR BUTTERFLY (*NEONYMPHA MITCHELLII MITCHELLII*)

1. D. 1. Full range map



1. D. 2. Focal area map



1. D. 3. Species profile



Mitchell's satyr (photo: © Barb Barton used with permission from Michigan Natural Features Inventory)

Status: Endangered

Life cycle: Eggs hatch within 7 to 11 days and larvae feed through summer until reaching the fourth instar, when they diapause. Captive reared satyrs have been observed to overwinter in the fourth instar at the base of tussock sedge (*Carex stricta*). Larvae resume feeding the following spring. In late spring to early summer (usually late-May to late-June) larvae form a pupa. After 10 to 15 days as pupae, adults emerge in mid-June to late-July, with peak flight typically during the first 2 weeks of July. Males generally emerge a few days before females. In the wild, the northern populations are univoltine (one generation per year). However, southern populations are bivoltine (two generations per year). Whether a population is univoltine or bivoltine may be controlled by accumulated degree-days.

Floral preferences: Mitchell's satyrs are usually found in close association with dense stands of tussock sedge, the primary host plant.

Adult food: Adult Mitchell's satyr rarely nectar. They have only been observed nectaring in the wild a few times.

Juvenile food: Food preference trials for captive larvae identified six species of *Carex* (*C. buxbaumii*, *C. lasiocarpa*, *C. leptalea*, *C. prairea*, *C. sterilis*, and *C. stricta*) and two grasses (*Panicum amplicatum* and *Poa palustris*) that support normal development until the third instar diapause in August.

Habitat: Mitchell's satyr habitat was originally described as bog fen. Since then, its habitat classification in the northern portion of its range has been more specifically described as prairie-fen. Both bog and prairie fens occur on peat soils.

Nesting sites: None. They lay their eggs directly on plants.

Breeding dates: Mid-June to late-July.

Overwintering sites: Overwinter as larvae on the leaves of tussock sedge.

Threats:

1. Human-induced destruction of Mitchell's satyr habitat by urban development, conversion to agriculture, or highway construction.
2. Human activities adjacent to occupied habitat that can speed succession.
3. Over-collection by butterfly collectors.
4. Inadequacy of existing regulatory mechanisms.
5. Limited ability to recolonize new habitat patches.

Management recommendations:

The Recovery Plan for the species does not identify specific conservation or management actions for Air Force lands. The species is not currently known to occur on Air Force lands, although it may occur there in the future. Contact the local USFWS Ecological Service Office if found on Air Force lands. Surveys or other appropriate site-specific management actions may be recommended. This information will help with two primary conservation actions: (1) continuing to define the southern range of Mitchell's satyr butterfly and (2) conducting surveys for unknown populations within appropriate habitats between the northern and southern populations.

Additional information: Mitchell's satyr habitat is classified as prairie fen in the northern portion of its range. Prairie fens are sedge-, grass- and wildflower-dominated wetlands with alkaline soils and a continuous supply of cold groundwater that is rich in calcium and magnesium carbonates and persists throughout the year. Prairie fens are confined to glaciated portions of the north-central U.S.

Most of the southern populations in Alabama are found in small, localized herbaceous-shrub patches, dominated by a diverse assortment of sedges and other wetland graminoids. The majority of these sites are located in wetlands that are associated with, or influenced or created by beaver (*Castor canadensis*) activity.

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SECTION 1. E. RUSTY PATCHED BUMBLE BEE (*BOMBUS AFFINIS*)

1. E. 1. Full range map

A current map of the range of the rusty patched bumble bee is provided at:
<https://www.fws.gov/midwest/angered/insects/rpbb/rpbbmap.html>

Distribution survey results are continuing to be submitted, even after finalization of this document. The map is updated periodically.

1. E. 2. Species profile



Female rusty patched bumble bee (photo: Tamara Smith, USFWS)

Status: Endangered

Life cycle: In early spring a solitary queen (or foundress) rusty patched bumble bee (RPBB) initiates a colony. The queen produces workers throughout the summer, and reproductive individuals (males and potential queens) in mid to late summer and early fall. The males and new queens (gynes, or reproductive females) disperse to mate. The original founding queen, males, and workers die. The new queens go into diapause over winter. The following spring, the new queen searches for a suitable nest site and collects nectar and pollen from flowers to support the production of her eggs. The eggs are fertilized using sperm the queen has stored since mating the previous fall. The queen is solely responsible for establishing the colony. As the workers hatch and the colony grows, the workers assume the responsibilities of food collection, colony defense, and care of the young, while the queen remains within the nest and continues to lay eggs.

Floral preferences: Bumble bees use nectar and pollen from a variety of flowers. Bumble bee superfoods and/or immune building plants include wild bergamot (*Monarda fistulosa*), prairie

clover (*Dalea sp.*), hyssop (*Agastache sp.*), goldenrod (*Solidago sp.*), asters (*Symphotrichum sp.*), leadplant (*Amorpha canescens*), joe pye weed (*Eutrochium sp.*), coneflowers (*Echinacea sp.*), sunflowers (*Helianthus sp.*), white turtlehead (*Chelone glabra*), and native wild blueberries and cranberries (*Vaccinium sp.*). Diverse flowering plants are required to ensure nectar and pollen are available throughout the colony's long active flight season. RPBBs may depend on woodland spring ephemeral flowers because of the species' early emergence. The USFWS, along with partners, developed a regionally and season-specific [planting list to support RPBBs](#).

Adult food: Bumble bees gather pollen and nectar from a wide variety of plant species, typically within 0.6 miles of their nest. The nectar provides carbohydrates and the pollen provides protein.

Juvenile food: The primary food of larvae is pollen.

Habitat: RPBBs are habitat generalists, but are typically found in areas that contain natural and semi-natural upland grassland, shrubland, woodlands, and forests. They may also be found in urban or suburban areas that contain nesting habitat, nectar and pollen resources, and overwintering habitat. In the spring RPBBs are often found in and near woodland habitats.

Nesting sites: RPBB nests are typically found in abandoned rodent nests or other similar cavities, one to four feet below ground. They occasionally have been observed above ground.

Breeding dates: RPBBs mate at the end of summer into fall (mid-October). The queen begins laying eggs in the spring (mid-March).

Overwintering sites: Bumble bees overwinter in small chambers in loose soil and/or leaf litter just a few centimeters below the ground, or in compost or rodent hills/mounds. Little is known about the specific overwintering habitats of RPBB queens. Overwintering habitat is often associated with woodland edges, which allows proximity to woodland spring ephemeral wildflowers.

Threats: The primary threats to the RPBB include disease, pesticides, habitat loss and degradation, effects of climate change, competition with non-native bees, and the effects of small population dynamics.

Management recommendations:

1. Follow the voluntary Conservation Management Guidance for RPBBs available online at <https://www.fws.gov/midwest/endangered/insects/rpbb/index.html>.
2. Create, enhance or maintain foraging, nesting, and overwintering habitat.
3. Plant regionally specific native plants, shrubs, and trees to provide pollen and nectar from early spring through late fall and include immune building plants and superfoods. For a region and seasonal specific plant list, see <https://www.fws.gov/midwest/endangered/insects/rpbb/plants.html>.
4. Implement or alter grazing practices, prescribed fire, or other land management to increase the diversity of native wildflowers and maintain or facilitate the development of nesting and overwintering habitat.

5. Remove and control invasive plants in woodlands, forest edges, prairies, and meadows in areas used for foraging, nesting, or overwintering.
6. Modify management actions (e.g., prescribed fire, mowing, grazing) in RPBB habitat to maintain or enhance RPBB habitat and prevent mortality. Adjust patch size and frequency of management actions to provide refugia for RPBB. Consider the availability of existing suitable habitat in the surrounding landscape and the ability of RPBB to re-colonize when planning management.
7. Reduce or eliminate use of pesticides. Use Integrated Pest Management (IPM) to reduce pesticide use.
8. Keep domesticated honey bee hives disease and pest free and at low densities near RPBB nesting sites.
9. Support key research to inform recovery actions. See a list of key research ideas at: <https://www.fws.gov/midwest/angered/insects/rpbb/surveys.html>.

Additional Information: The RPBB is one of the first bumble bees to emerge early in the spring and the last to go into hibernation. The number of queens a colony can produce is directly related to the amount of pollen available.

Find more information about rusty patched bumble bees and Endangered Species Act guidance specific to the species at: <https://www.fws.gov/midwest/angered/insects/rpbb/index.html>.

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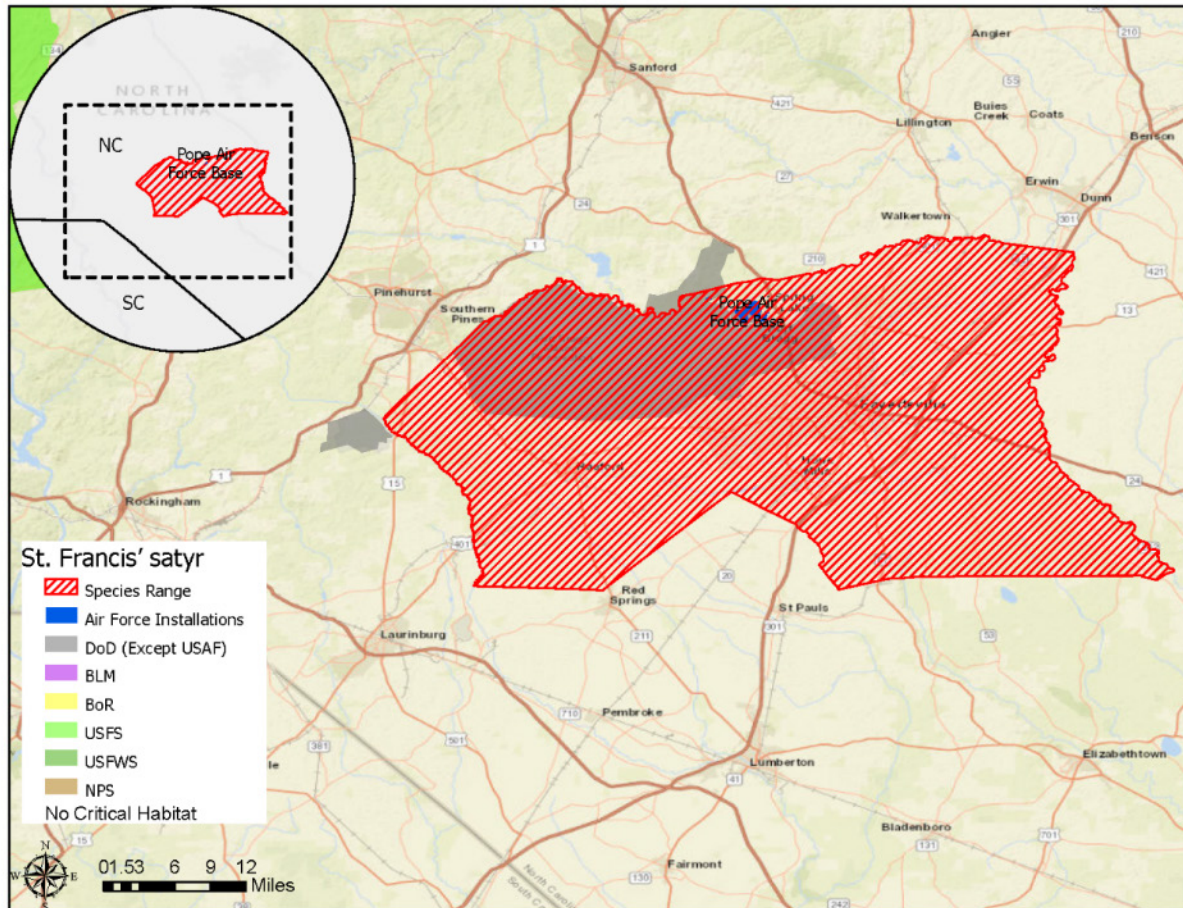
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SECTION 1. F. SAINT FRANCIS' SATYR BUTTERFLY (*NEONYMPHA MITCHELLII FRANCISCI*)

1. F. 1. Full range map



1. F. 2. Species profile



St. Francis satyr (photo: © Jenny McCarty, used with permission)

Status: Endangered

Life cycle: The St. Francis' satyr is bivoltine, with adults emerging in late May through early June and through early August. The first flight period is predictable based on growing degree days. The average adult lifespan is three to four days. Larval host plants are believed to be graminoids such as grasses, sedges, and rushes. Eggs are laid on host plants, develop, and emerge as larvae within seven to ten days. Larvae that emerge in early summer during the first brood pupate after two months. Pupation takes approximately two weeks and the first brood likely completes its life cycle in less than 80 days. Males typically emerge before females. The second brood is presumed to overwinter in the fourth larval instar stage and pupate the following spring.

Adult food: Adults generally do not feed on nectar. Individuals have been observed nectaring on pepperbush (*Clethra alnifolia*) on several occasions.

Juvenile food: Larvae have rarely been detected in the wild. Larval host plants are graminoids including several sedge species in the *Carex* family. The main host plant is believed to be *Carex mitchelliana*. The only larva observed in the wild was detected on *C. mitchelliana*. Larval feeding experiments and ongoing captive-rearing support that *C. mitchelliana* is an important larval food source. Other important plants include *C. atlantica* and *C. lurida*, which can support larvae in captivity, and *C. turgescens*, a common plant throughout occupied wetland sites.

Habitat: Early successional wetlands consisting primarily of sedges and other graminoids. These wetlands are generally associated with the floodplains of small headwater streams and are heavily influenced by disturbances such as periodic fires and beaver activities.

Nesting sites: None; eggs are laid directly on sedges.

Breeding dates: May through August

Overwintering sites: Overwinter as larvae low on vegetation close to (but not in) the soil.

Threats:

1. Habitat loss or degradation (including suppression of natural disturbances of periodic fires and beaver activities)
2. Collection
3. Illegal trade

Management recommendations:

1. Conduct restoration activities including hardwood removal and temporary stream impoundments to mimic the beneficial effects of fire and beaver.
2. Extend prescribed burns through riparian areas.
3. Close roadways at stream crossings where existing subpopulations occur. Firebreaks and other roads across streams can fragment wetlands and isolate subpopulations.
4. Release captive-reared butterflies into historic sites or unoccupied restoration sites.

Additional information:

Currently, all known subpopulations are restricted to Joint Base-Fort Bragg, NC. The population consists of a number of small inactive, but formerly occupied sites and active subpopulations. It is assumed that these combined sites comprise one population within an approximate area of 247 acres at Joint Base-Fort Bragg. Many of the active sites are located within artillery impact areas with restricted access, limiting monitoring and estimating population size. The few active sites where butterflies occur outside of artillery ranges have been established through active restoration efforts.

Small population sizes, limited dispersal ability (less than approximately 1.2 miles), and restricted distribution make the St. Francis satyr extremely vulnerable. Environmental variation and the disruption of disturbance regimes can greatly affect population sizes. Natural colonization events are infrequent, but captive-reared releases in restored habitats have been successful.

For more information see: https://www.fws.gov/raleigh/species/es_st_francis_satyr.html

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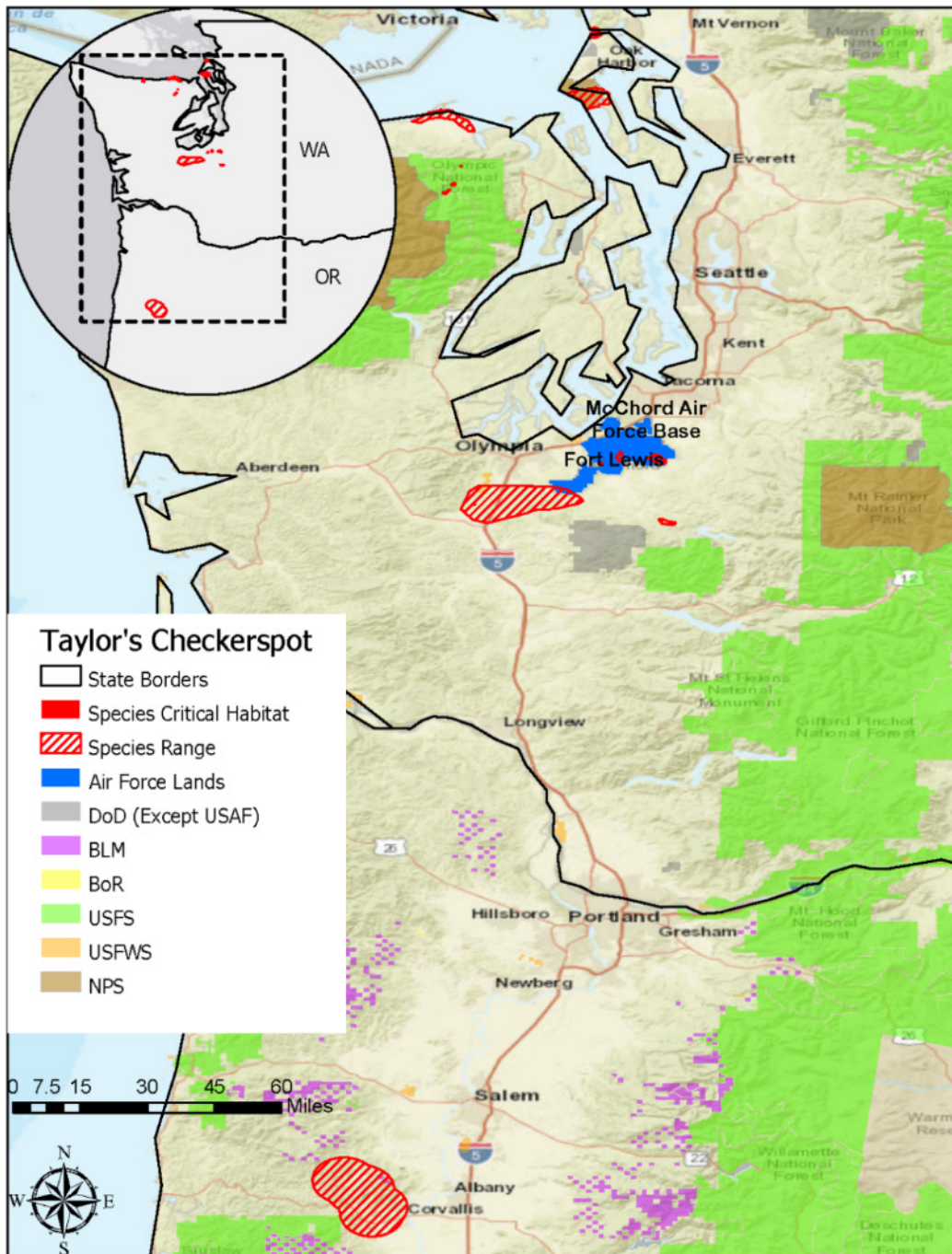
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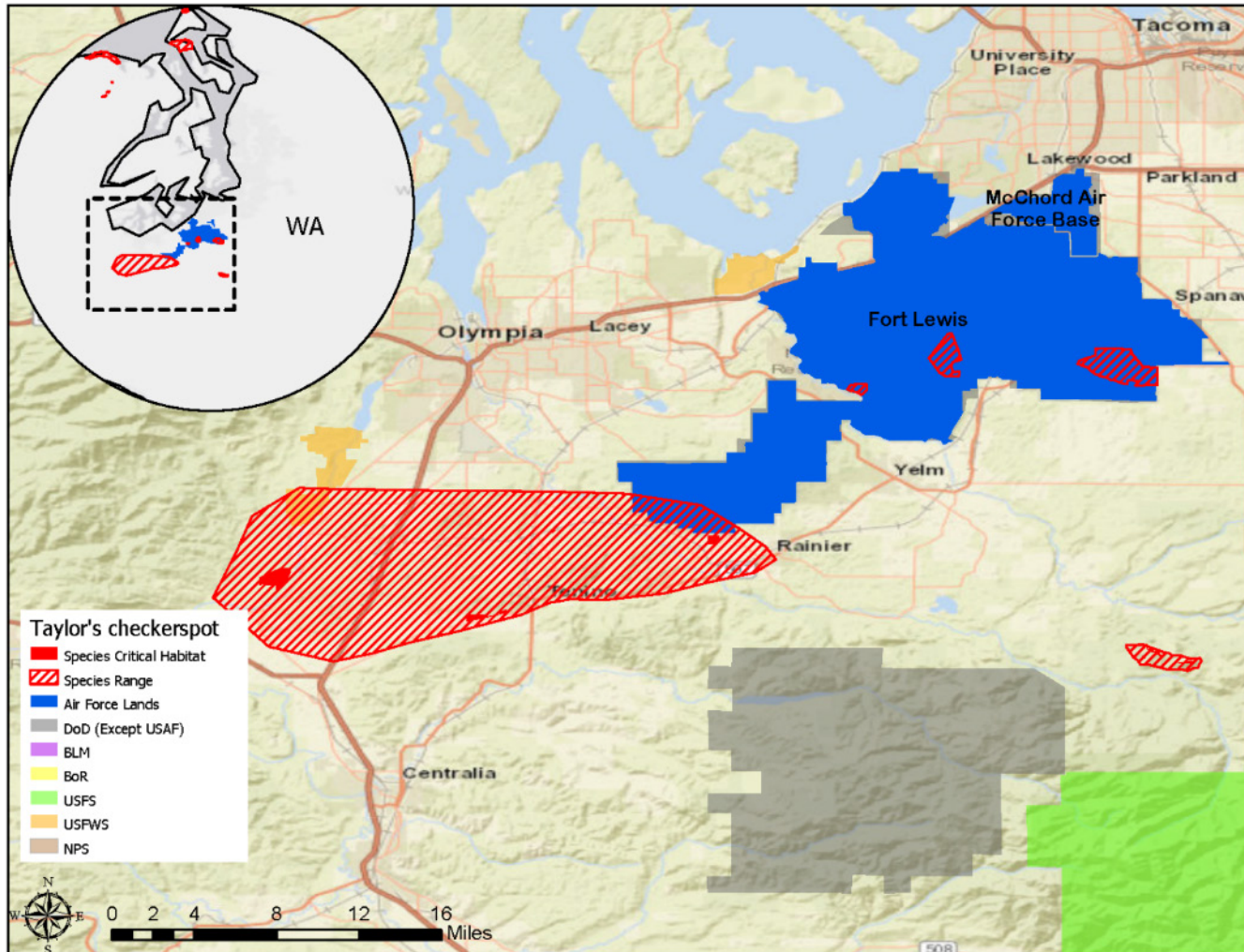
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SECTION 1. G. TAYLOR'S CHECKERSPOT BUTTERFLY (*EUPHYDRYAS EDITHA TAYLORI*)

1. G. 1. Full range map



1. G. 2. Focal area map



1. G. 3. Species profile



[Taylor's checkerspot](#) (photo: Ted Thomas/USFWS [CC BY-NC 2.0](#))

Status: Endangered

Life cycle: Taylor's checkerspot butterflies are univoltine, with each female producing up to 1,200 eggs during her lifespan. Eggs are generally laid in clusters of 20 to 350 eggs on the undersides of leaves or the lower portion of the stem of host plants in late April through May. Eggs hatch in approximately eight days. Larvae produce silk webbing on host plants and live and feed communally close to their host plants. Larvae develop through five instars. The larvae enter diapause after about one month of feeding. The onset of diapause coincides with the time when larval food plants are senescing, which varies with geography. Larvae emerge from diapause in late January to March of the following year and reinitiate feeding. Late instar post-diapause larvae move around the landscape to find a pupation site in late March. Occasionally post-diapause larvae will re-enter diapause until late winter the following year rather than forming a pupa immediately. Adult butterflies emerge from the pupa in two to six weeks with males emerging before females. Emergence is highly dependent on local environmental conditions. Adults feed and mate and repeat the cycle.

Floral preference/Adult food: Nectar plants for Taylor's checkerspots include the larval food plants: English plantain (*Plantago lanceolata*), paintbrushes (*Castilleja* spp.), sea blush (*Plectritis congesta*), small and large flowered blue-eyed Mary (*Collinsia parviflora* and *C. grandiflora*), and dwarf owl's clover (*Triphysaria pusilla*). Adults will also nectar on species larvae do not feed on, including Puget balsamroot (*Balsamorhiza deltoidea*) and common camas (*Camassia quamash*).

Juvenile food: Larval food plants are in the Plantaginaceae and Orobanchaceae families, including English plantain, or golden or harsh paintbrush. Additional food plants that may be

used for larval feeding are sea blush, small and large flowered blue eyed Mary, dwarf owl's clover, and several species of speedwell (*Veronica* spp.). See Table 1 for plant preference by life stage.

Habitat: Taylor's checkerspot butterflies are found in short-statured vegetation communities dominated by bunchgrasses and native prairie forbs. These may be found on well drained, postglacial prairies, meadows within a forested setting, coastal bluffs, stabilized dunes, and montane balds. A bald is an area generally found on south sloping terrain with shallow soils dominated by grasses, moss and lichen and herbaceous vegetation.

Nesting sites: None; eggs are laid directly on host plants.

Breeding dates: Adult butterflies breed nearly as soon as they eclose from their pupae in April and May each spring.

Overwintering sites: Sites used for diapause include shelter under rocks, logs or in soil litter.

Threats: Loss of native habitat, as a result of urban development, agriculture, and military uses, is a threat. Shifts in plant composition from grasses and forbs to woody vegetation dominated by forests, nonnative shrubs or nonnative pastures grasses, caused by the absence of wild or prescribed fire, preclude the conditions that are suitable to butterflies. Use of pesticides, and biological control, specifically *Baccillus thuringiensis kurstaki* within the range of the species, are threats.

Management recommendations:

1. Prescribed fire is the primary tool used to maintain sunny, open habitat for Taylor's checkerspot butterflies. Prescribed fires should be conducted in the fall and limited to one third of the occupied habitat patches.
2. Spot treatments with herbicides to treat nonnative plants that emerge in burned areas.
3. Plant seeds or seedlings of a mix of native prairie plants that support all butterfly life stages after burns.
4. Mow habitat with invading woody trees and shrubs in late fall and late winter to minimize or avoid direct impacts to the butterflies.
5. Captive rearing and translocation of Taylor's checkerspot butterflies.
6. Manage prairie to support multiple high quality habitat patches within a larger landscape context.

Additional information: A collaborative rearing and translocation effort between USFWS, Washington Department of Fish and Wildlife, and Joint Base Lewis McChord has been ongoing since 2006. The Oregon Zoo (Portland, OR) and the Mission Creek Correctional Center for Women (Belfair, WA) captive rear and produce 6,000 to 7,500 post-diapause larvae each year for this program. Larvae are placed into restored habitat in late February.

Taylor's checkerspot are sedentary butterflies. Butterflies may disperse up to approximately 1300 feet between high quality habitat patches. Adjacent high quality habitats and habitat corridors are essential for dispersal.

Table 1: Recommended food plants for adult and larval Taylor's checkerspot butterflies

Scientific Name	Common name	Adult nectar plant	Larval host plant
<i>Achillea millefolium</i>	Common yarrow	Yes	No
<i>Balsamorhiza deltoidea</i>	Puget balsamroot	Yes	No
<i>Camassia quamash</i>	Common camas	Yes	No
<i>Castilleja hispida</i>	Harsh paintbrush	Yes	Yes
<i>Castilleja levisecta</i>	Golden paintbrush	Yes	Yes
<i>Cirsium arvense</i>	Canada thistle	Yes	No
<i>Collinsia grandiflora</i>	Large-flowered blue-eyed Mary	Yes	Yes
<i>Collinsia parviflora</i>	Small-flowered blue-eyed Mary	Yes	Yes
<i>Eriophyllum lanatum</i>	Woolly sunshine	Yes	No
<i>Fragaria virginiana</i>	Wild strawberry	Yes	No
<i>Lomatium triternatum</i>	Nine-leaved desert parsley	Yes	No
<i>Lomatium utriculatum</i>	Fine-leaved desert parsley	Yes	No
<i>Lupinus albicaulis</i>	Sickle-keeled lupine	Yes	No
<i>Lupinus lepidus</i>	Prairie lupine	Yes	No
<i>Plantago lanceolata</i>	Narrow-leaved plantain	Yes	Yes
<i>Plantago major</i>	Common plantain	No	Yes
<i>Plectritis congesta</i>	Sea blush	Yes	Yes
<i>Triphysaria pusilla</i>	Dwarf owl-clover	Yes	Yes
<i>Veronica beccabunga</i> <i>var. americana</i>	American speedwell	No	Yes
<i>Veronica scutella</i>	Marsh speedwell	No	Yes
<i>Veronica. serpyllifolia</i>	Thymeleaf speedwell	No	Yes

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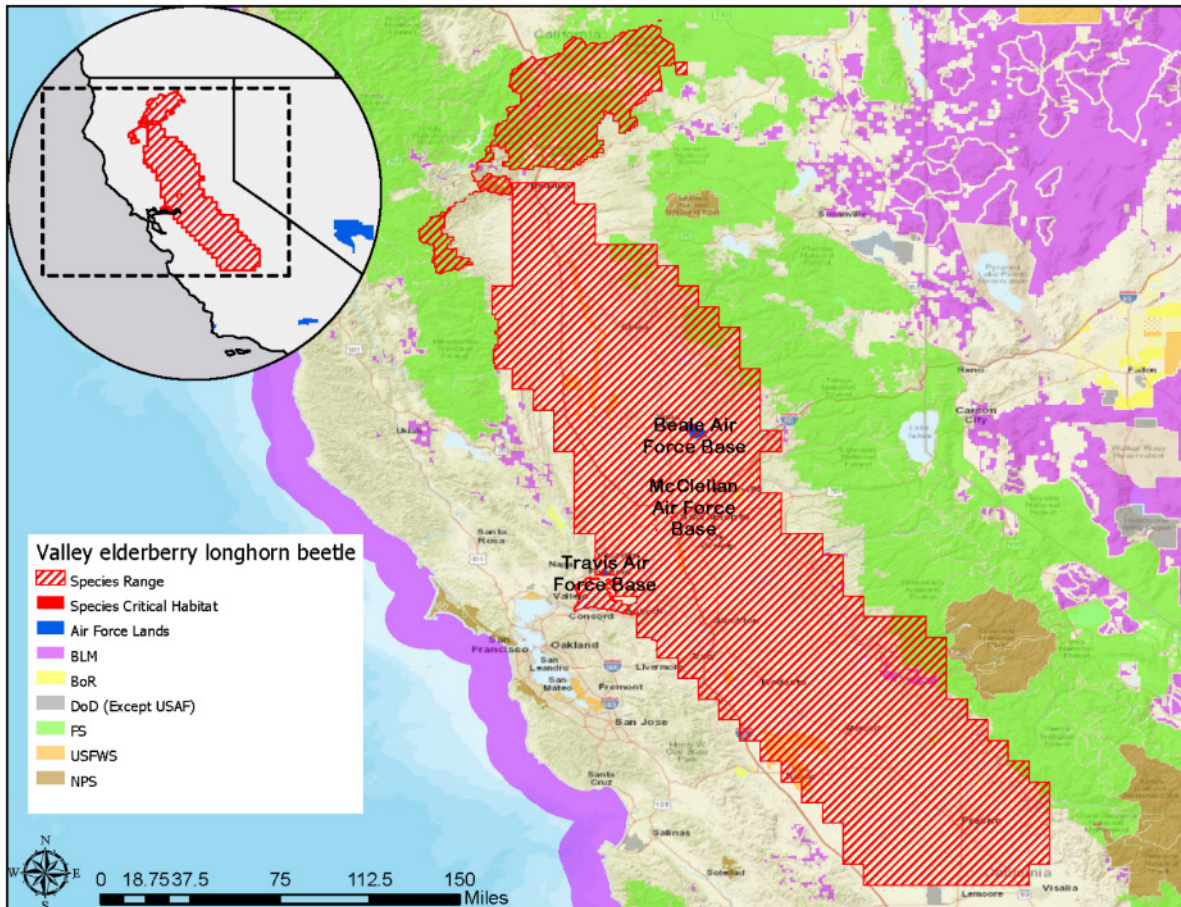
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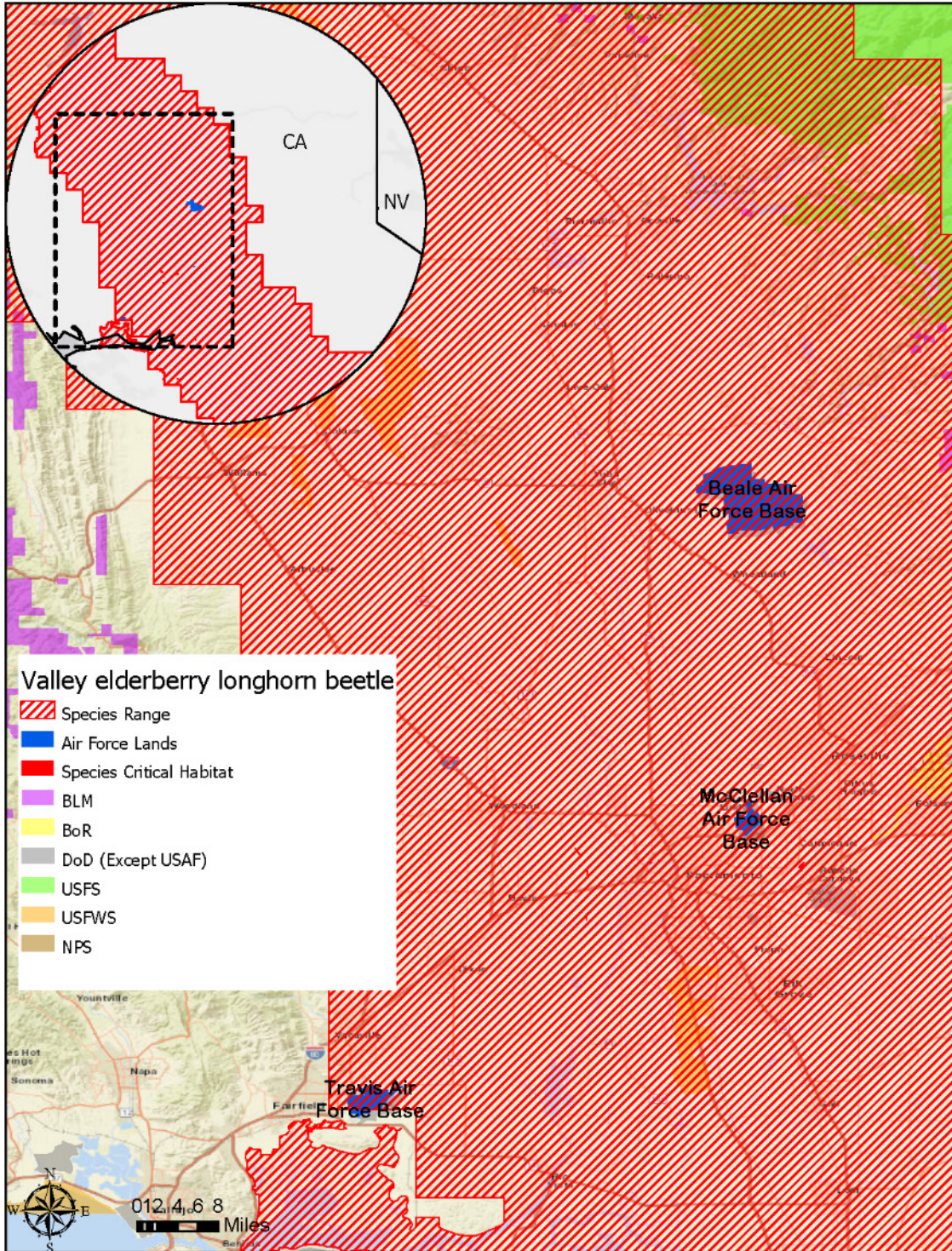
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SECTION 1. H. VALLEY ELDERBERRY LONGHORN BEETLE (*DESMOCERUS CALIFORNICUS DIMORPHUS*)

1. H. 1. Full range map



1. H. 2. Focal area map



1. H. 3. Species profile



Valley elderberry longhorn beetle (photo: John Katz and Joe Silveira/USFWS)

Status: Threatened

Life cycle: Adult valley elderberry longhorn beetles (VELB) are active, feeding and mating, from March until June. After mating, their eggs are deposited on live elderberry (*Sambucus* spp.) bushes in the crevices of the bark, at the stem/trunk junctions, or at the stem/petiole junctions. After hatching the larvae bore through the bark into the pith of the elderberry stem, where they tunnel and eat for up to two years. For the larvae to be successful in completing the cycle the stems of the elderberries must be at least one inch in diameter at ground level. In their last stage, larvae bore back out of the stem (thereby creating an “exit hole”) and then return to the pith, closing the exit hole with a substance composed of wood shavings or chewed wood and excrement. The larvae then enter the pupal stage. After transformation, the adult beetle need only break through the plug at the exit hole to continue the cycle once again among the elderberries. Typically, adult VELB emerge at about the same time as the elderberry flowers bloom (between mid-March and mid-June). Lizards, European earwigs (*Forficula auricularia*), and nonnative Argentine ants (*Linepithema humile*) prey upon the various life stages of the VELB.

Floral preferences: Elderberry plants.

Adult food: Adults eat elderberry leaves and flowers.

Juvenile food: Larvae eat the inside of the elderberry stem.

Habitat: VELB are found in riparian habitat along rivers and streams only in the vicinity of red or blue elderberry. Critical habitat was designated at the time of listing in two places (the Sacramento Zone and the American River Parkway Zone) along and close to the American River

in Sacramento. Over the past 25 years the loss of riparian habitat has slowed, and in the middle and northern Valley 50,000 acres of existing riparian habitat have been protected. In addition, 5,000 acres of riparian habitat have been restored specifically for the VELB.

Nesting sites: None. Eggs are deposited on elderberry plants.

Breeding dates: Between the months of March and June.

Overwintering sites: In the stems of the elderberry.

Threats: Extensive destruction of California's Central Valley riparian forests has occurred during the last 150 years due to agricultural and urban development. According to some estimates, riparian forest in the Central Valley has declined by as much as 89 percent during that time period. The VELB, though wide-ranging, is in long-term decline due to human activities that have resulted in widespread alteration and fragmentation of riparian habitats, and to a lesser extent, upland habitats, which support the beetle.

The primary threats to survival of the beetle include:

1. Loss and alteration of habitat by agricultural conversion
2. Inappropriate grazing
3. Levee construction, stream and river channelization, removal of riparian vegetation and rip-rapping of shoreline
4. Nonnative animals such as the Argentine ant, which may eat the early stages of the beetle
5. Recreational, industrial and urban development

Insecticide and herbicide use in agricultural areas and along road right-of-ways may be factors limiting the beetle's distribution. The age and quality (as a food plant for the beetle) of individual elderberry shrubs/trees and stands may also be a factor in VELBs limited distribution.

Management recommendations:

1. Restoration activities should include the planting of a mix of elderberry transplants and seedlings of different sizes/ages.
2. Restrict use of pesticides in VELB habitat or within 110 feet of an elderberry plant with one or more stems measuring one inch or greater in diameter at ground level.
3. Place signs every 50 feet along edge of any protected areas.
4. Monitor and protect known VELB sites and habitat.
5. Augment protected and managed areas.
6. Conduct standardized surveys.
7. Mow grasses and other ground cover from July through April to reduce fire hazard.
Reduce mowing within five feet of elderberry plant stems and avoid damaging plants.

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SECTION 1.I. YELLOW-FACED BEES, INCLUDING ANTHRICINAN (*Hylaeus anthracinus*) AND HAWAIIAN (*H. longiceps*)

The range for these Hawaiian species is not well enough known to produce a map. *Hylaeus anthracinus* and *H. longiceps* have been found recently at Ka'ena Point on Oahu (see Magnacca and King, 2013). The other listed *Hylaeus* species have been recorded from higher elevations or are not known to occur on Oahu.

1. I. 1. Species profile



Anthricinan yellow-faced bee (photo: © S. Plentovich, used with permission)

Status: Endangered

Life cycle: Little is known about the specific life cycle and developmental stages of Hawaii's yellow-faced bees. Based on other bees in this genus, yellow-faced bees are solitary nesters but may form loose nesting aggregations in suitable habitat. Eggs are laid singly in individual cells and provisioned with pollen. Once eggs hatch, larvae molt through three instars before changing into pupae. Pupae do not eat but finish development before metamorphosing into adults. The seasonality and environmental cues that trigger nesting and emergence as adults have not been described for these species.

Floral preferences: Both *Hylaeus* species collect nectar and/or pollen from the following native species: *Chamaesyce degeneri*, *Myoporum* spp., *Scaevola sericea*, *Sesbania tomentosa*, *Sida fallax*, and *Waltheria indica*. Additional plants documented as used by either *H. anthracinus* or *H. longiceps* include *Chamaesyce celastroides*, *Santalum ellipticum*, and *Vitex rotundifolia*. The

nonnative species, *Tournefortia argentea*, has been documented as a useful nectar and pollen plant.

Adult food: Adults use a variety of native flowering shrubs and forbs for nectaring and pollen-collection. Only a few introduced species are known to be utilized as foraging plants.

Juvenile food: Pollen and possibly nectar provisioned by foraging adults.

Habitat: Coastal strand habitat.

Nesting sites: Nesting occurs in pre-existing holes in wood, hollow stems, rock and coral rubble. Both species may also nest in holes in the ground, but it is difficult to document because invasive ants readily depredate those nests.

Breeding dates: Year-round nesting has been identified with peaks from March to September. Nesting is likely based on environmental cues and plant phenology.

Threats:

1. Loss of habitat due to habitat destruction, urbanization and spread of nonnative plant species
2. Depredation of nests and adults by invasive ants
3. Competition for nest sites and floral resources with introduced bees including the introduced *Hylaeus strenuous*
4. Habitat modification due to nonnative animals and fire
5. Coastal flooding due to climate driven changes

Management recommendations:

1. Prevent the spread of invasive ants, especially the yellow crazy ant (*Anoplolepis gracilipes*) through biosecurity measures.
2. Plant native flowering plants so that nectar, pollen, and nest sites are available throughout the year.
3. Maintain coastal strand habitat by removing nonnative plant species.
4. Reduce or eliminate the use of insecticides and herbicides.
5. Replace nonnative plants with native species used by yellow-faced bees.
6. Control nonnative ungulates through fencing, trapping, and/or other removal methods.
7. Work with appropriate agencies to reduce nonnative insect predators.
8. Prevent destruction and degradation of coastal strand habitat by limiting access to sensitive areas and preventing vehicle or all-terrain vehicle (ATV) use.

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SECTION 2: POLLINATORS DESIGNATED AS BIRDS OF CONSERVATION CONCERN

SECTION 2. A. MANAGEMENT RECOMMENDATIONS FOR ALL HUMMINGBIRDS

1. Plant pollinator gardens with nectar-rich native plants blooming throughout the time hummingbirds are present in the local area.
2. Install hummingbird feeders near natural nectar sources as an additional source of nectar. Maintain a proper cleaning and disinfecting schedule so as not to cause harm to the hummingbirds from spoiled nectar. A simple nectar ratio of one part granulated white sugar to four parts water is all that is necessary. Do not use other types of sweeteners to make nectar or add red dye since these can be harmful to the birds' health.
3. When possible, do not suppress natural forest fires, which can open up sunny clearings and rich soil for nectar plants. Long-term fire suppression can result in declines in nectar plant availability and habitat loss due to catastrophic wildfires.
4. Prevent overgrazing, which can reduce the number of nectar plants and shrubs used for shelter, nesting, and roosting.
5. Remove invasive plants, which can crowd out or even kill off native nectar plants. However, if a hummingbird population depends on a large population of invasive vegetation during migration (e.g., culturally significant eucalyptus, *Eucalyptus spp.*, and tree tobacco, *Nicotiana glauca*), then the best practice is to prevent further spread of these invaders (Centre for Agriculture and Biosciences International (CABI), 2017a; CABI, 2017b; Stanturf, et al., 2013). If large areas are planned for eradicating nectar producing invasives, then it would be best to remove them when hummingbirds are not active in the area and replace them with nectar-rich natives.
6. Reduce or eliminate the use of pesticides. Insecticide residue on plants and insects can be harmful to hummingbirds. Herbicides should be used with caution to avoid spraying nectar plants.
7. Keep cats indoors since even bell collars offer little protection to hummingbirds or other species.
8. Prevent window and building collisions by breaking up the reflectivity of glass with patterns or screens and placing hummingbird feeders three feet or less from windows; the closer the better. See USFWS's (2016) [*Reducing Bird Collisions with Buildings and Building Glass Best Practices*](#) document for more details.

References:

CABI. 2017a. [Eucalyptus globulus](#) (Tasmanian blue gum) [original text by Andrew Praciak]. *In: Invasive Species Compendium*. Wallingford, UK: [CAB International](#).

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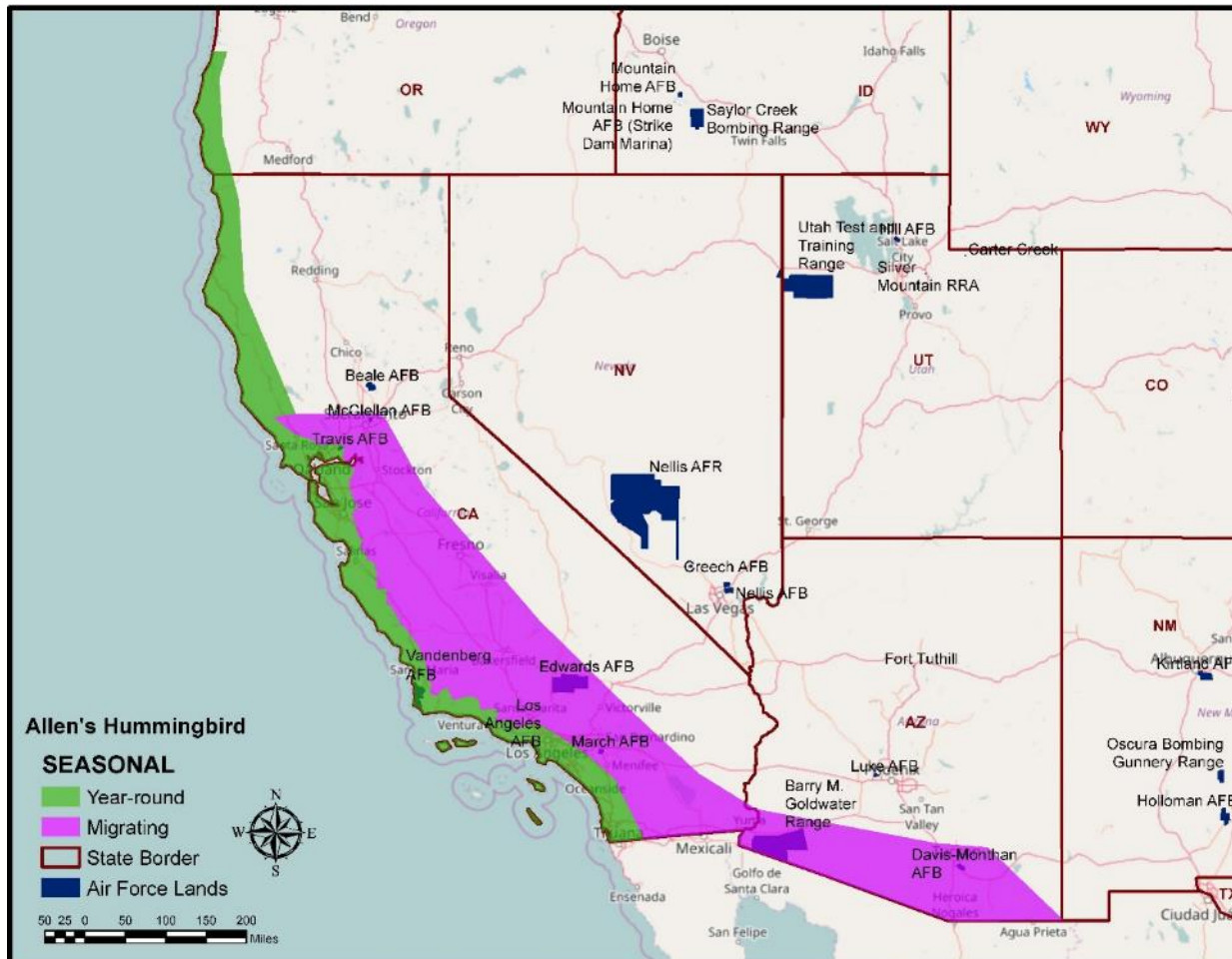
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SECTION 2. B. ALLEN'S HUMMINGBIRD (*SELASPHORUS SASIN*)

2. B. 1. Full U.S. range map



2. B. 2. Species profile



[Allen's Hummingbird](#) (photo: Alan Schmierer, CC0 1.0)

Life cycle: Adults migrate from the wintering grounds in Mexico to breeding areas along the coasts of western California and southwestern Oregon. The female raises two young per brood. She may raise two to five broods during a long breeding season. Eggs hatch between 17 to 22 days after incubation. Fledging occurs around 22 to 25 days after hatching. Juveniles may continue to be fed by the female shortly after leaving the nest. Shortly after the breeding season most adults and juveniles migrate back to the breeding grounds in Mexico. Life span is probably similar to other hummingbirds at 3 to 5 years on average, and possibly as many as 12 years.

Floral preferences: Allen's Hummingbird is closely interconnected with several endemic Pacific Coast plants. Some of these plants are threatened or endangered. They also will visit introduced plants, such as eucalyptus (*Eucalyptus* spp.) and tree tobacco (*Nicotiana glauca*). They utilize many native plants, such as twinberry honeysuckle (*Lonicera involucrate*), bush monkeyflower (*Diplacus* spp.), fuchsiaflowered gooseberry (*Ribes speciosum*), Indian paintbrush (*Castilleja* spp.), western columbine (*Aquilegia formosa*), penstemon (*Penstemon* and *Keckia* spp.), manzanita (*Arctostaphylos* spp.), and western leatherwood (*Dirca occidentalis*). Red-colored flowers with a tube-shaped corolla are especially attractive.

Adult food: Flower nectar, small insects, and tree sap. Regularly feeds at hummingbird feeders.

Juvenile food: The female hummingbird feeds young a slurry of small insects and flower nectar until, and sometimes shortly after, they fledge. Juveniles observe adult feeding behavior and independently find flower nectar, insects, and tree sap. Juveniles also visit hummingbird feeders.

Habitat: This hummingbird has the most restricted breeding range of all the North American hummingbirds. It is limited to the stretch of the Pacific Coast from southern California to

southern Oregon. This area is regularly affected by summer fogs. Males prefer open and shrubby habitats to maintain breeding territories, while females prefer sites with more dense vegetation and tree cover for nesting.

Nesting sites: Allen's Hummingbirds nest in a variety of locations, from low shrubs to high tree canopies. Nests are very small (two inches or less in diameter) and cup-shaped. Nesting material is usually white plant down and animal hair held together by spider web silk and camouflaged with small pieces of lichen, moss, and bark fragments. Their nests stretch to accommodate growing chicks.

Breeding dates: Begins in January (south) to mid-February (north) continuing until early July.

Overwintering sites: Most Allen's Hummingbirds winter along the Pacific coast of central Mexico in forest edges and clearings. The non-migratory subspecies are year-round residents in California's Channel Islands and may occur in small numbers further north up the coast to southern Oregon. This subspecies often settles near groves of blooming eucalyptus, but will use feeders in urban areas.

Migration dates: Arrives at their northern breeding sites from January to March and leaves for over-wintering sites by September. Northbound migration is tied to the onset of winter rains and the phenology of flowers of coastal California. Individuals likely migrate in a series of steps, spending one to two weeks in an area to regain energy before continuing their migration. Males arrive at northern breeding grounds before females to establish territory. Males head south in mid-May or June, well before the females and juveniles depart.

Threats: Habitat loss is a major threat. Capture by outdoor house cats and collision with windows are occasional threats. It is unclear if these sources of mortality may cause some habitats to become population sinks.

Management recommendations: See management recommendations for all hummingbirds at the start of Section A.2.

Additional information: Populations are in decline. This species is on the 2016 Partners in Flight (PIF) Landbird Conservation Plan Yellow Watch List. Species on this list have restricted ranges and small populations; therefore they require constant care and long-term assessment to prevent population declines. The half-life (estimated number of years until an additional 50% of the population is lost) for the Allen's Hummingbird is estimated to be 17 years.

Individuals are highly territorial towards each other and other hummingbird species during breeding season. Courtship territories can include an area as large as approximately 82 x 82 feet, or larger. Feeding territories are generally smaller and shift in location more often than breeding territories.

Small sources of water (e.g., dew, rain, waterfall spray, small puddles on a rock surface, or even a sprinkler) for preening and bathing are important. Bird baths are often too large and deep for hummingbirds.

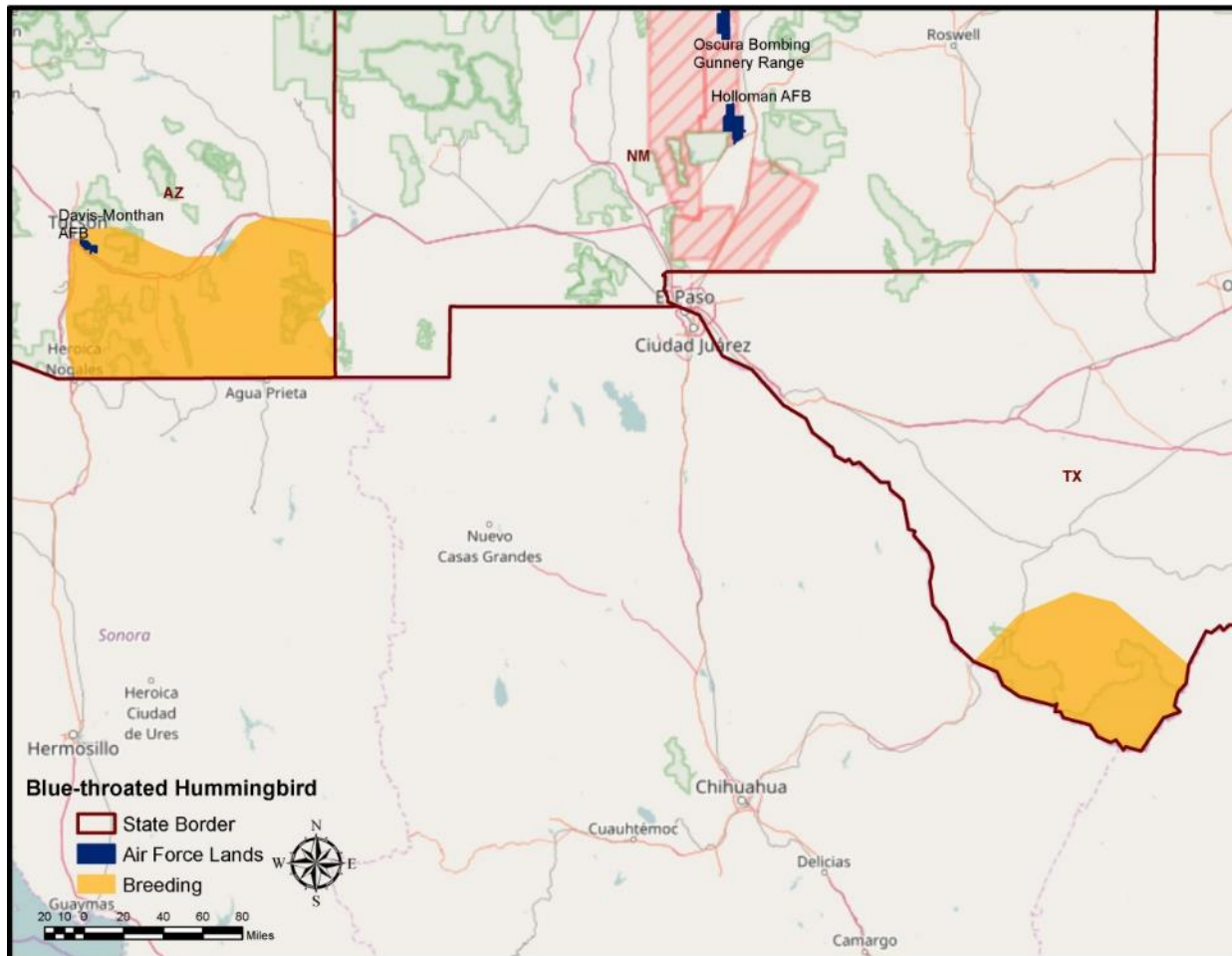
This species is frequently confused with Rufous Hummingbirds. A small proportion of male Rufous Hummingbirds have green backs and can be mis-identified as Allen's Hummingbirds. Females and juveniles of both species are nearly indistinguishable.

References:

- Clark, C. J. and D. E. Mitchell. 2013. [Allen's Hummingbird \(*Selasphorus sasin*\)](#). In: P. G. Rodewald (ed.). *The Birds of North America*. Cornell Lab of Ornithology, Ithaca.
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SECTION 2. C. BLUE-THROATED HUMMINGBIRD (*LAMPORNIS CLEMENCIAE*)

2. C. 1. Full U.S. range map



2. C. 2. Species profile



[Blue-throated Hummingbird](#) (photo: Alan Schmierer, [CC0 1.0](#))

Life cycle: Adults migrate from the wintering habitat in Mexico to the sky island mountain ranges of western Texas and southeastern Arizona where they breed. The female cares entirely for two (or rarely one) young per brood. She may raise as many as three broods per season. Egg incubation lasts for 17 to 19 days. Fledglings depart the nest 24 to 26 days after hatching. Juveniles are often fed by the female for several days after leaving the nest. Shortly after the breeding season, adults and juveniles migrate back to the wintering grounds in Mexico. There is very little information about observed life span, but some data suggests a maximum of eight years.

Floral preferences: Utilizes nectar from large flowers, such as sage (*Salvia* spp.), canary columbine (*Aquilegia chrysantha*), bearded penstemon (*Penstemon barbatus*), Mexican lobelia (*Lobelia laxiflora*), cardinal monkeyflower (*Mimulus cardinalis*), Texas betony (*Stachys coccinea*), Arizona thistle (*Cirsium arizonicum*), coralbells (*Heuchera sanguinea*), agave (*Agave* spp.), skyrocket (*Ipomopsis* spp.), desert honeysuckle (*Anisacanthus thurberi*), twinberry (*Lonicera involucrate*), and New Mexico locust (*Robinia neomexicana*). They will also visit nonnative tree tobacco (*Nicotiana glauca*).

Adult food: Flower nectar, small insects, and tree sap from sapsucker wells. Regularly comes to hummingbird feeders.

Juvenile food: The female hummingbird feeds young a slurry of small insects and flower nectar until, and sometimes shortly after, young fledge. Juveniles observe adult feeding behavior and independently find flower nectar, insects, and tree sap. Juveniles also visit hummingbird feeders after fledging.

Habitat: Relies on wooded canyon streams with plenty of sycamores (*Platanus* spp.) and maples (*Acer* spp.) within localized areas in the sky island mountain ranges of western Texas and southeastern Arizona during the breeding season. Prefers shady, cool pine-oak forest edges and shrubby areas, but can venture out into drier habitats in search of food. Found mainly in middle to higher elevations near perennial streams.

Nesting sites: Usually nests near a stream, often directly over the water on a low tree branch. Nests can also be found on overhanging bank or cliff ledges, cave entrances, or building eaves. Nest typically two inches or less in diameter. Nests are constructed of spider silk, white plant fibers, and camouflaged with green mosses and other plant materials. Nests often reused for **multiple broods or seasons.**

Breeding dates: Primarily April to early August.

Overwintering sites: The migratory population winters near the northern edge of the resident population's range in Mexico's mountains and foothills from southern Chihuahua, Nuevo León, and southwestern Tamaulipas. Wintering habitat is similar to breeding range and also includes lower elevations.

Migration dates: In the spring, migrants arrive to the northern breeding areas between March and May. Fall migration begins in September to late October. Shortly after the breeding season, adults and juveniles migrate back to the wintering grounds in Mexico.

Threats: The Blue-throated Hummingbird is very tolerant of living near humans and in man-made structures; however, the specificity of their habitat needs makes them vulnerable to habitat loss from residential and natural resource extraction activities. Fire suppression can also be detrimental since natural forest fires promote the growth of nectar plants and increase the availability of wood ash. Feeders have helped support some populations during times of limited nectar resources, but these can also increase exposure to predators and windows. Climate change may also cause rising temperatures and decreased perennial stream water availability, leading to habitat degradation.

Management recommendations: See management recommendations for all hummingbirds at the start of Section A.2.

Additional information: The Blue-throated is the largest hummingbird that breeds in the United States.

Blue-throated Hummingbirds are very territorial and can often have long chases and physical attacks on other hummingbirds. It is unclear how far this species flies on a daily basis. The distance from a male singing perch to a feeding station could range from approximately 100 to 1300 feet depending on the type of intervening vegetation.

Wood ash is needed for to provide calcium and other minerals for eggshell production.

References:

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Williamson, S. L. 2000. [Blue-throated Hummingbird \(*Lampornis clemenciae*\)](#). In: P. G. Rodewald (ed.). *The Birds of North America*. Cornell Lab of Ornithology, Ithaca.

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2. D. 2. Species profile



[Buff-bellied Hummingbird](#) (photo: Alan Schmierer, [CC0 1.0](#))

Life cycle: Most of the U.S. population resides year-round in central/southeastern Gulf Coast of Texas. A small number migrate to wintering areas along the Gulf Coast in the fall. Typically two eggs are laid during one brood each season. It is unknown which sex incubates the eggs. It is presumed to be the female as with other hummingbird species. The length of time eggs take to hatch or young birds stay in the nest are unknown. After the breeding season, a small migratory group of adults and juveniles move eastward toward wintering grounds. Some individuals have reached nine years in age.

Floral preferences: Feeds on a very wide variety of native nectar flowers such as: coral bean (*Erythrina herbacea*), Mexican olive (*Cordia boissieri*), tropical sage (*Salvia coccinea*), Texas ebony (*Ebenopsis ebano*), mesquite (*Prosopis* spp.), and anacua (*Ehretia anacua*). Will also visit commonly planted nonnatives, mainly in winter, such as hibiscus (*Malvaviscus* spp.), shrimp plant (*Justicia brandegeana*), aloe (*Aloe* spp.), banana (*Musa* spp.), and fountain plant (*Russelia equisetiformis*). Flowers visited are not all typical “hummingbird flowers” (i.e., red color, tubular shape, no scent).

Adult food: Flower nectar and small insects. Adults also feed on tree sap from sapsucker wells in winter. Regularly visits hummingbird feeders.

Juvenile food: The female hummingbird feeds young a slurry of small insects and flower nectar until, and sometimes shortly after, young fledge. Juveniles observe adult feeding behavior and independently find flower nectar, insects, and tree sap. Juveniles also visit hummingbird feeders after fledging.

Habitat: Utilizes a variety of habitats such as humid coastal thorn scrub, oak woodlands, forest edges, parks, and residential gardens. In the Lower Rio Grande area of Texas, coastal oak mottes and subtropical riparian forests are used.

Nesting sites: Found often near woodland roads and paths usually in the fork of a twig in a bush or small tree. Nests are typically one and a half inches in diameter and are constructed with plant fibers, dried flower pieces, small bark shreds, and light colored lichens, secured in place with spider webs.

Breeding dates: March through August.

Overwintering sites: Most of the U.S. population does not migrate. A small migratory group of adults and juveniles overwinters along the Gulf Coast from Texas to the southwestern Panhandle of Florida. Individuals that migrate are more often found near urban gardens and feeders.

Migration dates: Most of the population is not migratory. A small group migrates east in October, returning to breeding grounds in Texas in March.

Threats: Predation from feral cats is a major cause of mortality. Individuals that winter in more northern areas can be susceptible to severe winter storms since the Buff-bellied Hummingbird is not a very cold-hardy species. Habitat degradation from agricultural brush clearing, livestock grazing, and residential development reduce the availability of native nectar resources. Although there has been widespread habitat destruction, this species has expanded northward and inland in Texas with the introduction of feeders and ornamental flowers.

Management recommendations: See management recommendations for all hummingbirds at the start of Section A.2.

Additional information: The Buff-bellied Hummingbird is the only large tropical hummingbird to regularly nest in southernmost Texas.

It is relatively sedentary throughout most of its range. There is no information available on the size of its territories.

It utilizes water spray from sprinklers. It is not known if this behavior is for cleaning feathers or for cooling down.

References:

Bent, A .C. 1940. Life histories of North American cuckoos, goatsuckers, hummingbirds and their allies. *Bull. - U.S. Natl. Mus.* 176, 1-506.

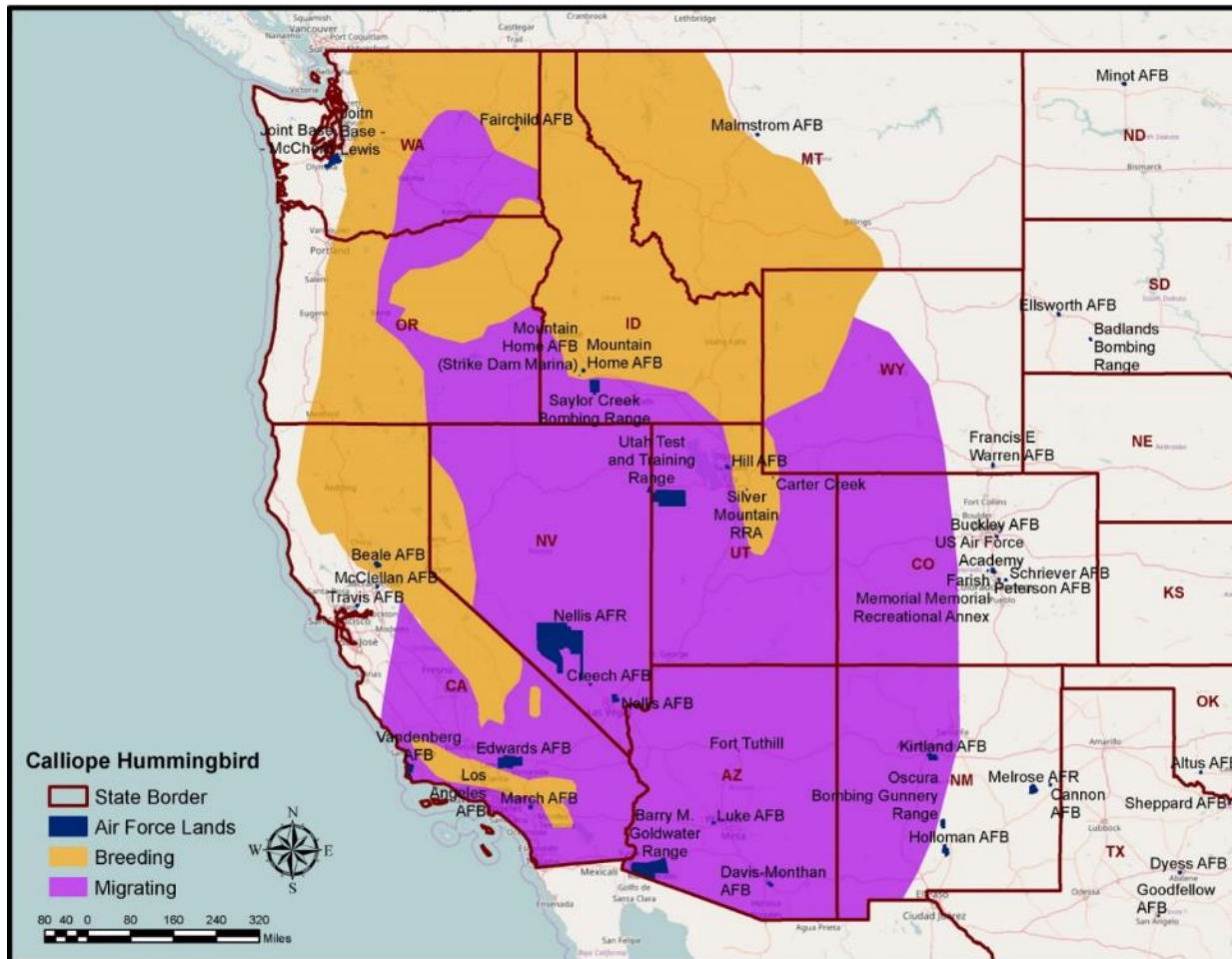
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SECTION 2. E. CALLIOPE HUMMINGBIRD (*SELASPHORUS CALLIOPE*)

2. E. 1. Full U.S. range map



2. E. 2. Species profile



[Calliope Hummingbird](#) (photo: Alan Schmierer, [CC0 1.0](#))

Life cycle: Adults migrate northward in the spring from Mexico through the western U.S. to breeding grounds in California, Nevada, Utah, Oregon, Washington, Idaho, Montana, Wyoming and southern British Columbia. The female hummingbird is the primary caretaker for two young. There is no evidence of a second brood during the breeding season. Egg incubation lasts for 15 to 16 days. Young remain in the nest for 18 to 21 days after hatching. After the breeding season, adults and juveniles migrate south through a wider variety of habitats (e.g., mountains, desert riparian corridors) and western states to wintering ground in Mexico. The typical lifespan is five to six years based on recapture data from banded birds.

Floral preferences: Visits a wide variety of high-elevation native plants including red currant (*Ribes triste*), Indian paintbrush (*Castilleja* spp.), orange honeysuckle (*Lonicera ciliosa*), western columbine (*Aquilegia formosa*), skyrocket (*Ipomopsis* spp.), Rocky Mountain bee plant (*Cleome serrulata*), beardtongue (*Penstemon* spp.). Also utilizes flowers that are atypical “hummingbird flowers” such as yellow monkey flower (*Mimulus tilingii* var. *caespitosus*), lousewort (*Pedicularis semibarbata*), snow plant (*Sarcodes sanguinea*), and pine-mat manzanita (*Arctostaphylos nevadensis*). When foraging, the Calliope Hummingbird feeds on flowers towards the bottom of the plant, unlike most other hummingbirds.

Adult food: Adults feed on flower nectar and small insects, as well as tree sap from sapsucker wells. They regularly use hummingbird feeders.

Juvenile food: The female hummingbird feeds young a slurry of small insects and flower nectar until, and sometimes shortly after, young fledge. Juveniles observe adult feeding behavior and independently find flower nectar, insects, and tree sap. Juveniles also visit hummingbird feeders.

Habitat: The Calliope Hummingbird is a mountain-loving species and prefers habitats from 4,000 to 11,000 feet in elevation. They are often found near the timberline in montane conifer forests, along streams, aspen groves, and in second growth forests that have previously been clear-cut or burned. Sunny openings in the forest canopy, which can encourage the growth of nectar shrubs for nesting are important. Calliope Hummingbirds are frequently found in urban areas during migration – visiting feeders and using flowering eucalyptus trees.

Nesting sites: Nests are often built among clusters of old cones in conifer trees, such as lodgepole pine (*Pinus contorta*), ponderosa pine (*P. ponderosa*), Jeffrey pine (*P. jeffreyi*), silver fir (*Abies grandis*), Douglas-fir (*Pseudotsuga* spp.), Engelmann spruce (*Picea engelmannii*), western hemlock (*Tsuga heterophylla*), western red-cedar (*Thuja plicata*). The nest is usually found under an overhanging branch, which provides cover from the elements and protection from predators. Nests are 1.7 inches or less in diameter. They are made of plant down and spider webbing and camouflaged with small bits of tree bark, cone shreds, needles, and lichens. Nest sites are often reused year after year, usually with a new nest built on top of the old one.

Breeding dates: Mid-May to July.

Overwintering sites: Low elevation arid thorn forests to humid pine-oak in southwestern Mexico. Although not shown on the preceding map, records of fall migrating and wintering occurrences are becoming increasingly common along the U.S. Gulf Coast to northwestern Florida.

Migration dates: Adults migrate northward in the spring from Mexico through southern California and Nevada up through Oregon and Washington and over to Idaho, Montana, Wyoming, and Utah beginning in early to mid-April. The males arrive at breeding grounds before females. After the breeding season, adults and juveniles migrate south through a wider variety of habitats (e.g., mountains, desert riparian corridors) and western states to the wintering ground in Mexico. Fall migration is early for adult males beginning in July or early August, with females and juveniles following a week or more later.

Threats: The Calliope Hummingbird may be impacted by habitat threats to aspen, coniferous forest, montane riparian, montane shrubland, and springs habitats. Breeding Bird Survey data indicate significant declines from 1966 to 1991 in Oregon and the coastal mountains of southern California, both of which are at or beyond the limits of breeding range.

Management recommendations: See management recommendations for all hummingbirds at the start of Section A.2.

Additional information: The Calliope is the smallest hummingbird that breeds in the United States, with adults weighing less than a penny (0.088 oz.). The typical territory size is estimated to be about 0.5-0.7 acres.

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Bent, A. C. 1940. Life histories of North American cuckoos, goatsuckers, hummingbirds and their allies. *Bull. - U.S. Natl. Mus.* 176, 1-506.

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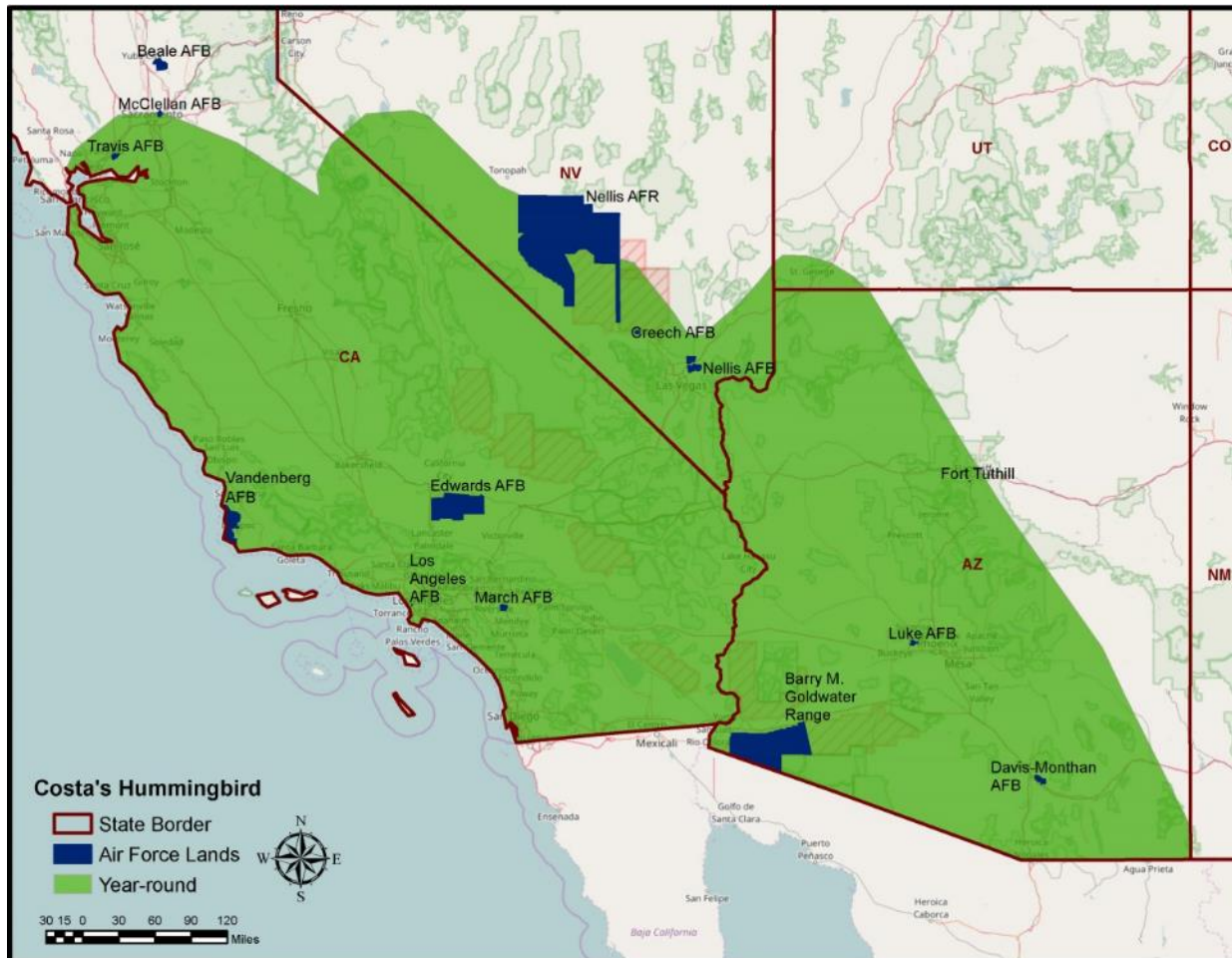
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SECTION 2. F. COSTA'S HUMMINGBIRD (*CALYPTE COSTAE*)

2. E. 1. Full U.S. range map



2. E. 2. Species profile



[Costa's Hummingbird](#) (photo: Alan Schmierer, [CC0 1.0](#))

Life cycle: Most members of this species are year-round residents of western Arizona, southwestern Utah, southern Nevada, and southern California. After breeding, the female is the primary caregiver to young. One brood per season has been documented, however it is speculated that a second brood may occur in peripheral areas of the northern and eastern range edges. Two eggs are normally laid and are incubated for 15 to 18 days. Young leave the nest between 20 and 23 days after hatching. Some individuals migrate south to Mexico after the breeding season. Not enough information is known about its lifespan.

Floral preferences: Visits flowers with many different shapes, sizes, and colors, even those that are not considered typical hummingbird flowers. Favorite resources include barestem larkspur (*Delphinium scaposum*), desert lavender (*Hyptis emoryi*), woolly blue-curls (*Trichostema lanatum*), wolfberry (*Lycium* spp.), fairy-duster (*Calliandra eriophylla*), ocotillo (*Fouquieria splendens*), chuparosa (*Justicia californica*), desert honeysuckle (*Anisacanthus thurberi*), coral-bean (*Erythrina flabelliformis*), bush-monkeyflower (*Diplacus* spp.), and penstemon (*Penstemon* spp.).

Adult food: Flower nectar and small insects. Regularly visits hummingbird feeders. There is no evidence of Costa's Hummingbirds visiting sapsucker wells.

Juvenile food: The female hummingbird feeds young a slurry of small insects and flower nectar until, and sometimes shortly after, young fledge. Juveniles observe adult feeding behavior and independently find flower nectar and insects. Juveniles also visit hummingbird feeders.

Habitat: Desert scrub habitat, including dry rocky hillsides composed of cacti and thorny shrubs and desert riparian areas, within the Sonoran and Mojave Deserts. California chaparral,

California coastal shrub, and Cape deciduous forest habitats to 4,500 feet in elevation are also important. This species does well in recently burned chaparral areas. Costa's Hummingbird uses urban and residential habitats, especially outside of breeding season.

Nesting sites: Nests are built in a wide variety of trees, shrubs, or dense vines. Nests have even been constructed in dead yucca (*Yucca* spp.) stalks, branching cacti (*Cylindropuntia* spp.), and man-made structures such as a hammock hook under a porch. Nests are 1.5 inches in diameter, on average, and are constructed with plant fibers, stems, and other small materials all held together by spider silk. Some nests are camouflaged with lichen while others are left mostly bare.

Breeding dates: Mid-January to May in the Sonoran desert scrub habitat, but mainly March to June elsewhere.

Overwintering sites: The year-round resident population can be found throughout Baja California, Southern California's coast and foothills, Mojave Desert, southwest Arizona, and Sonora (Mexico). Non-resident birds migrate to Baja California and Sonora south to Jalisco, Mexico and most likely utilize mountain forests up to 6,000 feet in elevation.

Migration dates: Partial migrant. For non-resident birds, spring migration takes place from February to April and fall migration occurs in June. Males often arrive at northern breeding grounds about one week before females and depart well before females and juveniles.

Threats: The Costa's Hummingbird is common in much of its historic range although it has experienced habitat loss within its range. The main threat is habitat alteration, degradation, and loss, particularly in the California coastal scrub and Sonoran desert scrub habitats. The Costa's Hummingbird does well in chaparral environments with a frequent fire regime, but does poorly in desert scrub that experiences unnatural frequent fires. The clearing of desert scrub, thorn forest, and tropical deciduous forest for the planting of fire-prone South African buffleggrass for cattle forage in northwestern Mexico may be one of the most serious threats facing this species. The alteration of desert environmental conditions due to climate change is also a threat. The Costa's Hummingbird has shown some adaptability to agricultural and urban development. While the Costa's utilizes urban and suburban environments with the introduction of feeders and exotic nectar plants, the Anna's hummingbird is displacing it in many areas.

Management recommendations: See management recommendations for all hummingbirds at the start of Section A.2.

Additional information: The Costa's Hummingbird prefers the driest climates of all North American hummingbirds.

For males, typical territory size is fairly large, ranging from approximately 2.5 to 3.7 acres.

Wood ash, a source of calcium and other minerals is needed for eggshell production.

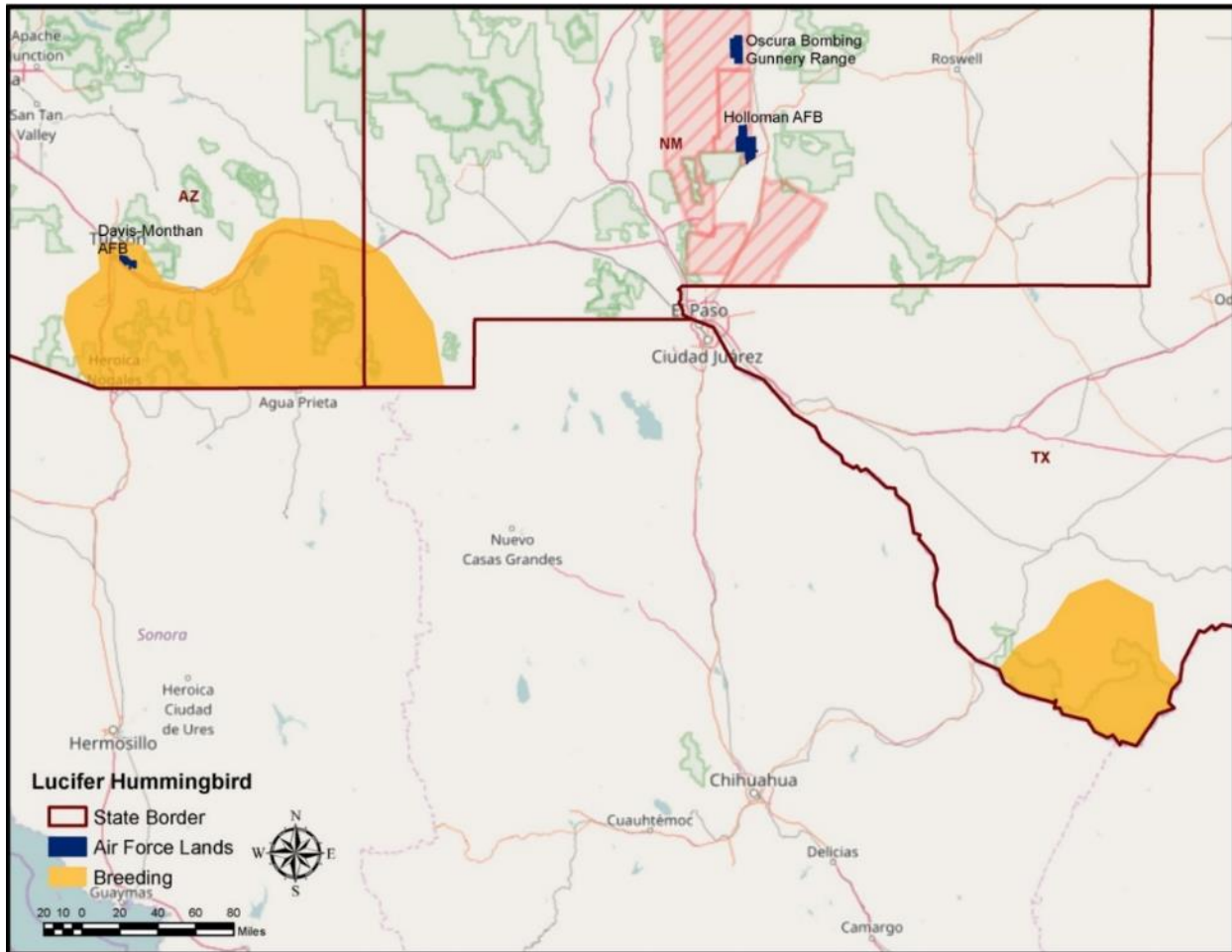
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SECTION 2. G. LUCIFER HUMMINGBIRD (*CALOTHORAX LUCIFER*)

2. G. 1. Full U.S. range map



2. G. 2. Species profile



[Lucifer Hummingbird](#) (photo: Alan Schmierer, [CC0 1.0](#))

Life cycle: This species migrates from wintering grounds in central and southwest Mexico to the Big Bend area of Texas. A few migrate to southwest New Mexico and southeast Arizona in the spring. After breeding, the female is the primary caregiver to the young. There are usually two broods per season. Two eggs are incubated for 15 to 16 days. Young leave the nest between 19 and 23 days after hatching and continue to be fed near the nest for 13 to 19 days after fledging. Females may continue to care for fledglings while constructing a new nest and incubating a second clutch. After the breeding season, adults and juveniles migrate south to the wintering grounds. The oldest banded and recaptured bird lived at least four years; however, their lifespan is probably longer.

Floral preferences: Visits a variety of native flowering plants, such as agave (*Agave* spp.), desert honeysuckle (*Anisacanthus* spp.), Chiso bluebonnet (*Lupinus havardii*), ocotillo (*Fouquieria splendens*), Big Bend beardtongue (*Penstemon havardii*), Parry's penstemon (*Penstemon parryi*), Mexican buckeye (*Ungnadia speciosa*), Indian paintbrush (*Castilleja* spp.), esperanza (*Tecoma stans*), dwarf anisacanth (*Anisacanthus linearis*), and desert willow (*Chilopsis linearis*). Also visits nonnatives like tree tobacco. Actively seeks out Havard's agave (*Agave havardiana*), but is a non-pollinating nectar thief of this plant.

Adult food: Flower nectar and small insects. Regularly visits hummingbird feeders. No evidence of visiting sapsucker wells.

Juvenile food: The female hummingbird feeds young a slurry of small insects and flower nectar until, and shortly after, young fledge. Juveniles observe adult feeding behavior and independently find flower nectar and insects. Once fledged, juveniles also visit hummingbird feeders.

Habitat: In the U.S., this species is very rare and local. It is regularly seen near the Chisos Mountains in Big Bend National Park, Texas. Other consistent breeding areas include southwestern New Mexico and southeastern Arizona. Habitat includes dry canyons, talus slopes, desert washes, and sycamore lined streams. Their range continues in the dry oak woodland of the Chihuahuan Desert region in south to south-central Mexico.

Nesting sites: Nests are usually built in shrubs, live/dead cane cholla (*Cylindropuntia imbricata*) stalks, dead lechuguilla (*Agave lechuguilla*) stalks, or on the leafy branches of ocotillo. Nests are around 1.45 to 1.73 inches in diameter and are constructed with plant down, grass seeds, small leaves, and bound together with spider webs. Nests in the U.S. have not been observed with lichen decorations.

Breeding dates: April to September in the U.S.

Overwintering sites: Central and southwest Mexico at elevations from approximately 2,600 to 5,900 feet. Found in arid open habitats with scattered trees and shrubs; has no definitive preference for any specific plant species. (Johnsgard, 1997)

Migration dates: Migrants arrive in Texas from mid-March to mid-April, and in New Mexico and Arizona in April. Fall departure occurs in September.

Threats: The current size of the U.S. population and breeding density is largely unknown. The Lucifer Hummingbird is currently on the Yellow Watch List in the 2016 PIF Landbird Conservation Plan. Occupation of arid, open, and often very rugged terrain may help protect them from human impacts.

Management recommendations: Monitor habitat areas for the presence of Lucifer Hummingbirds to increase the number of records of observation. Report sightings to [eBird](#), an online database of bird observations. Records reported through eBird are available to USFWS and the public.

See additional management recommendations for all hummingbirds at the start of Section A.2.

Additional information: The Lucifer Hummingbird has one of the most distinctive shapes of all North American hummingbirds with a downward curved bill and a deeply forked tail.

Feeding territories are sometimes closely associated with the flowering agave distribution. In the U.S., a circular feeding area with an approximately 39-foot radius has been documented.

References:

Johnsgard, P. A. 1997. *The hummingbirds of North America, second edition*. Smithsonian Institution Press, Washington, DC, 278 pp.

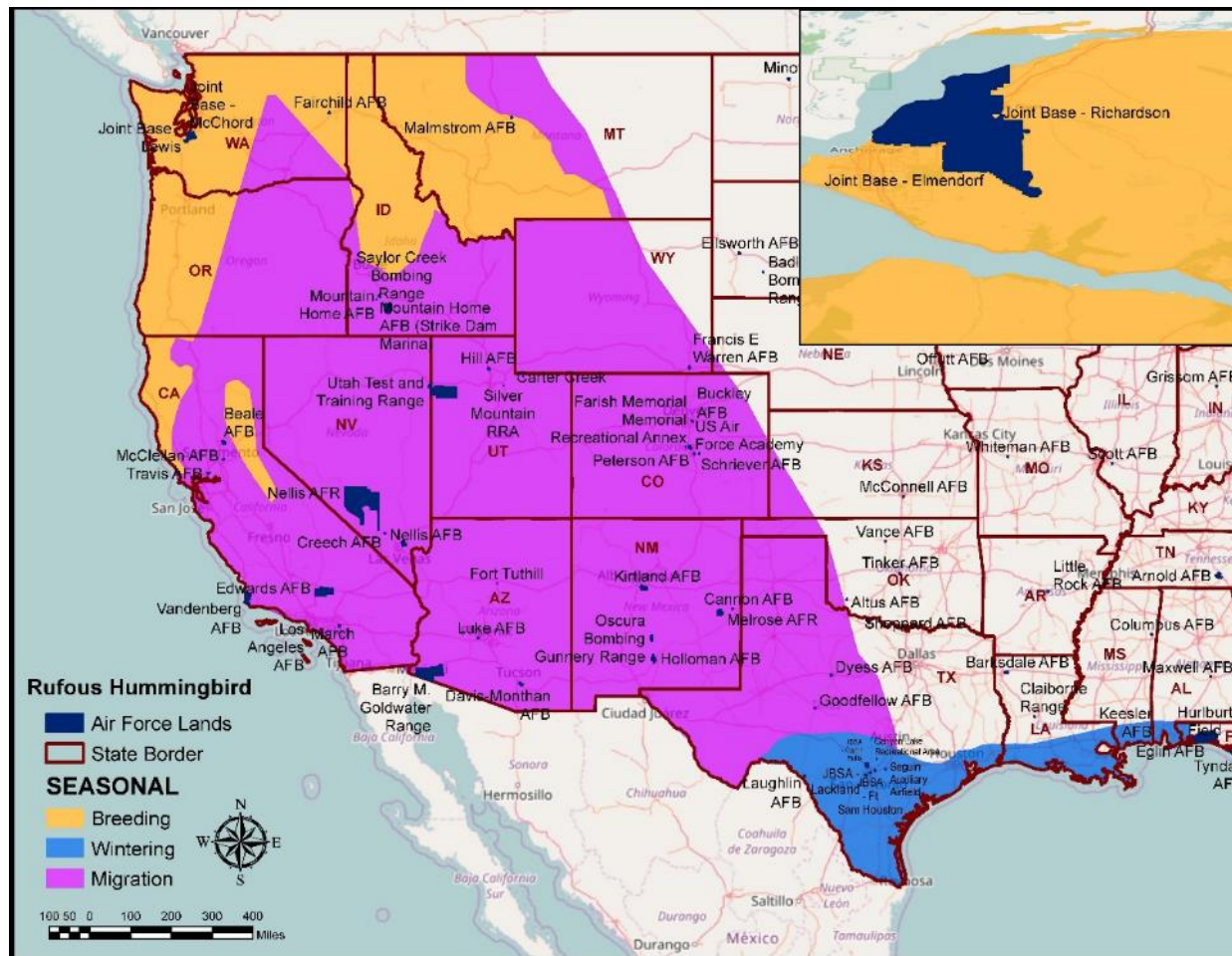
Rosenberg, K. V., J. A. Kennedy, R. Dettmers, R. P. Ford, D. Reynolds, J. D. Alexander, C. J. Beardmore, P. J. Blancher, R. E. Bogart, G. S. Butcher, A. F. Camfield, A. Couturier, D. W. Demarest, W. E. Easton, J. J. Giocomo, R. H. Keller, A. E. Mini, A. O. Panjabi, D. N. Pashley, T. D. Rich, J. M. Ruth, H. Stabins, J. Stanton, and T. Will. 2016. [Partners in Flight Landbird Conservation Plan: 2016 revision for Canada and continental United States](#). PIF Science Committee, 119 pp.

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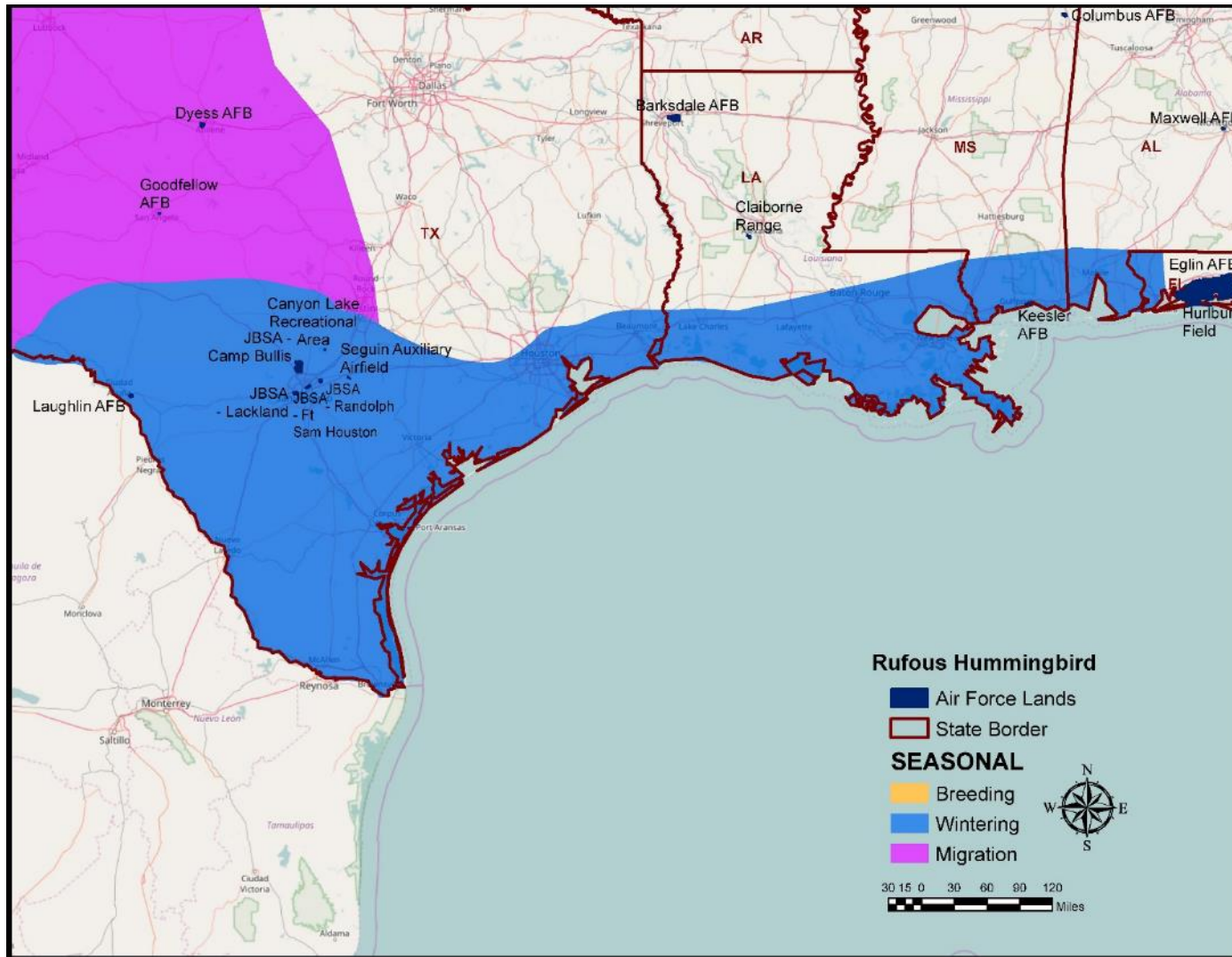
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SECTION 2. H. RUFIOUS HUMMINGBIRD (*SELASPHORUS RUFUS*)

2. H. 1. Full U.S. range map



2. H. 2. Focal area map – Gulf coast



2. H. 3. Species profile



[Rufous Hummingbird](#) (photo: Alan Schmierer [CC0 1.0](#))

Life cycle: Adults migrate northward in the spring from central Mexico along the Pacific coast to the breeding grounds. The female is the primary caretaker of young. Two (very rarely three) eggs are laid and incubated for 15 to 17 days. Young fledge around 21 days after hatching. After leaving the nest, young are fed for a short time on perches near the nest. Fall migration generally occurs along the Rocky Mountains, but can cover much of the western U.S. The oldest individual recorded was 8 years 11 months.

Floral preferences: Utilizes a wide variety of native flowers such as columbine (*Aquilegia* spp.), skyrocket (*Ipomopsis* spp.), beardtongues (*Penstemon* spp.), fireweed (*Chamerion angustifolium*), beebalm (*Monarda* spp.), Indian paintbrush (*Castilleja* spp.), larkspur (*Delphinium* spp.), honeysuckle (*Lonicera* spp.), sage (*Salvia* spp.), red currant (*Ribes sanguineum*), salmonberry (*Rubus spectabilis*), Rocky mountain beeplant (*Cleome serrulata*), and manzanita (*Arctostaphylos* spp.). Nonnative favorites include eucalyptus (*Eucalyptus* spp.), tree tobacco (*Nicotiana glauca*), fuchsia (*Fuchsia* spp.), red-hot-poker (*Kniphofia uvaria*), orange trees (*Citrus* spp.), and peach trees (*Prunus persica*).

Adult food: Flower nectar and small insects. Feeds on tree sap from sapsucker wells. Regularly comes to hummingbird feeders. Early migrants often rely on insects and sap before flowers bloom.

Juvenile food: The female hummingbird feeds young a slurry of small insects and flower nectar until, and sometimes shortly after, young fledge. Juveniles observe adult feeding behavior and independently find flower nectar, insects, and tree sap. Juveniles also visit hummingbird feeders.

Habitat: Breeds in the northwestern U.S., covering portions of California, Oregon, Washington, Idaho and Montana. This range extends into Alberta, British Columbia, and southeastern Alaska. They typically breed in mixed conifer-hardwood forest and coastal temperate rainforest, usually in openings, edges, and shrubby areas. During their migration, they can be found in mountain meadows up to 12,600 feet in elevation.

Nesting sites: Nests are usually hidden in drooping branches of coniferous or deciduous trees. They are usually 1.8 inches in diameter and 2.5 to 30 feet off the ground. Nests are constructed with soft plant down held together with spider webs, and camouflaged with lichen, moss, and bark. Nests often are rebuilt on the foundation of the previous year's nest.

Breeding dates: March to July.

Overwintering sites: This species is prone to wide-scale wandering during the non-breeding season. Their nonbreeding distribution includes the Baja Peninsula, Mexico, southern portions of Texas, Louisiana, Mississippi and Alabama, and northeastern Florida. It has been reported from all states east of the Rocky Mountains and nearly all Canadian provinces and is frequently found east of the Mississippi River in the winter. It uses a variety of habitats, including scrubby second growth and thorn forests, high oak and pine-oak forests, and urban and suburban gardens.

Migration dates: Spring migration occurs between March and May. Adult males normally arrive and depart the northern breeding grounds one to two weeks earlier than females. Migration often occurs in short segments and follows the northern reach of nectar plants in bloom. Fall migration occurs between late June and August.

Threats: Threats include habitat degradation by fire, or heavy grazing which can significantly reduce abundance of blooming plants during fall migration. Population growth could be restricted by the short nesting period, long migration, and habitat. Feeding stations also expose them to dangers such as window strikes, cats, and pesticides.

Management recommendations: See management recommendations for all hummingbirds at the start of Section A.2.

Additional information: The Rufous Hummingbird is North America's northernmost breeder and travels an incredible distance between its summer breeding grounds and wintering homes.

Populations are in decline. This species is on the 2016 PIF Landbird Conservation Plan Yellow Watch List. The half-life is estimated to be 34 years.

This species is very aggressive and highly territorial towards its own species and even larger hummingbird species. They will dominantly defend flower patches and feeders in breeding areas and migration stopovers.

This species is frequently confused with Allen's Hummingbirds. A small proportion of male Rufous Hummingbirds have green backs and can be mis-identified as Allen's Hummingbirds. Females and juveniles of both species are nearly indistinguishable.

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Grant, K. A. and V. Grant. 1968. *Hummingbirds and their flowers*. Columbia University Press, New York, NY, 115 pp.

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SECTION 2. I. ADDITIONAL RESOURCES FOR HUMMINGBIRDS

Species profiles:

- ECOS: <http://ecos.fws.gov/ecp/>
- Birds of North America: <https://birdsna.org/Species-Account/bna/home>
- Audubon Guide to North American Birds: <http://www.audubon.org/bird-guide>
- Western Hummingbird Partnership:
<http://www.westernhummingbird.org/index.php?page=hummerguide>

USFWS. *For the Birds* pamphlet on backyard birding:
<https://publications.usa.gov/epublications/forbirds/forbird.htm>

Pollinator Partnership information about hummingbirds:
<http://www.pollinator.org/hummingbirds>

USFWS. *Reducing Bird Collisions with Buildings and Building Glass Best Practices*:
<https://www.fws.gov/migratorybirds/pdf/management/reducingbirdcollisionswithbuildings.pdf>

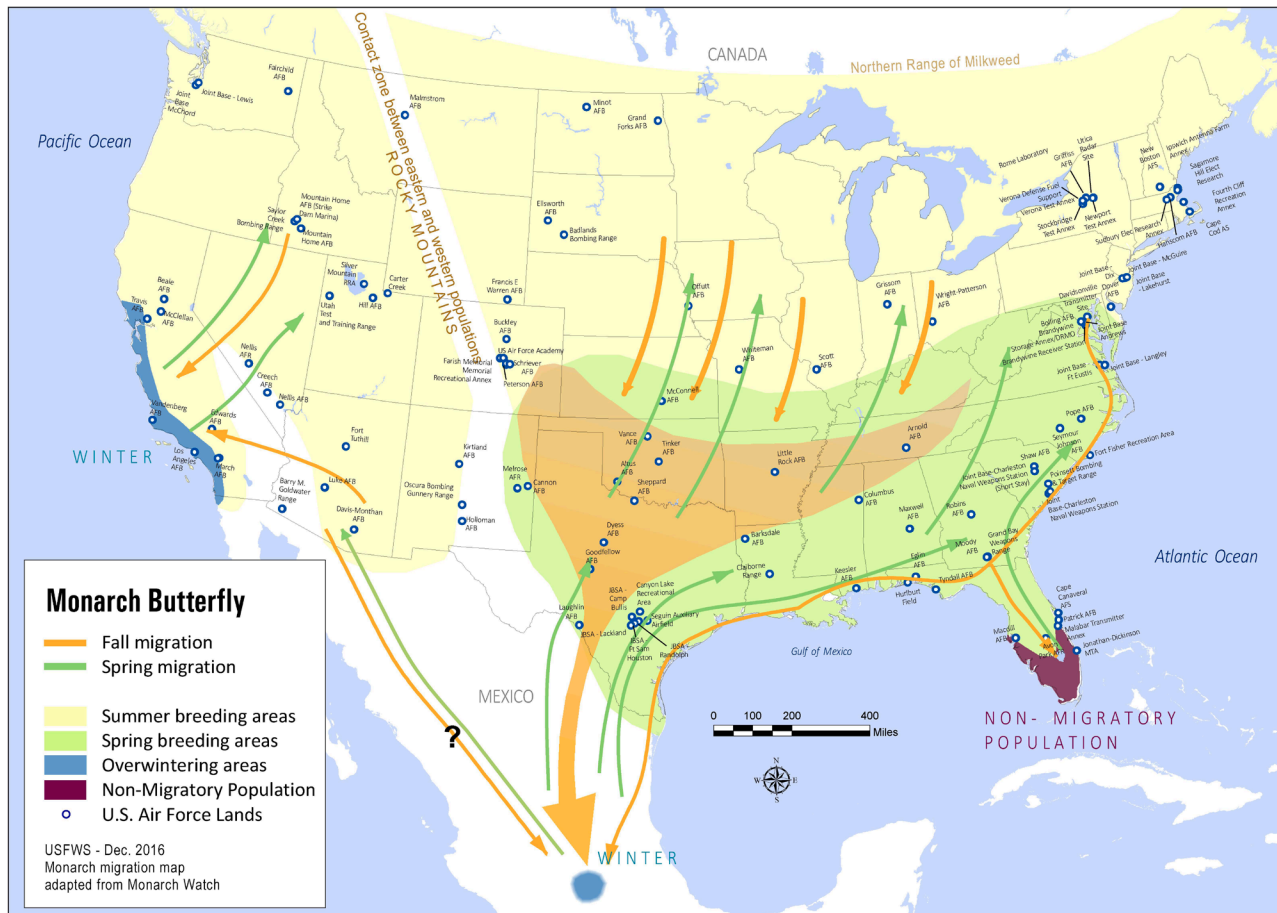
SECTION 3: MONARCH BUTTERFLY (*DANAUS PLEXIPPUS PLEXIPPUS*)

Two maps are provided for the monarch butterfly. Priority breeding and migration areas for the Eastern population include spring and summer breeding and migration areas throughout the central flyway in Texas, Oklahoma, Kansas, Arkansas, Missouri, Iowa, Nebraska, North and South Dakota, Minnesota, Michigan, Illinois, Indiana, Ohio, Kentucky and Pennsylvania.

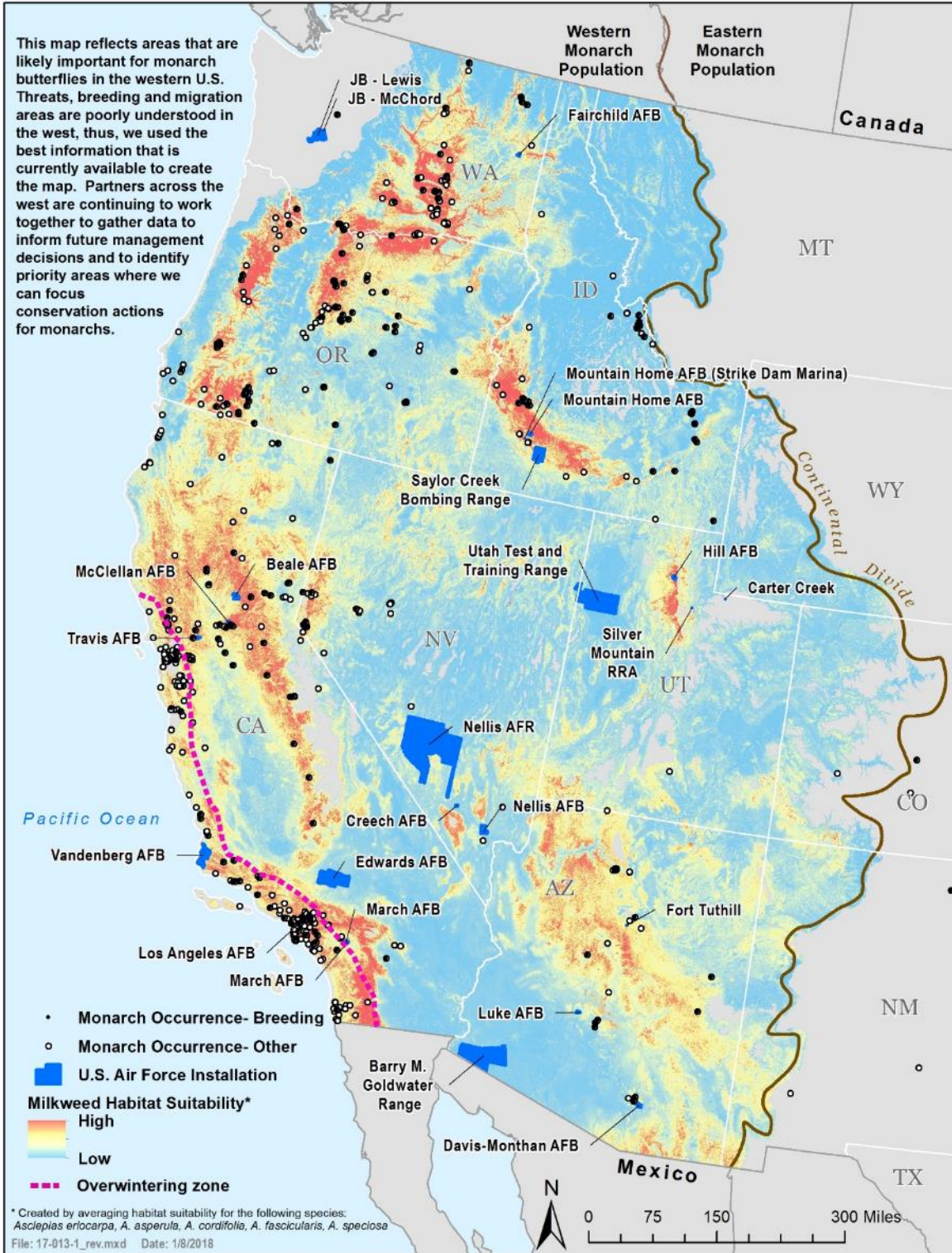
The monarch butterfly – western population map reflects areas that are likely important for monarch butterflies in the western U.S. Threats, breeding and migration areas are poorly understood in the west, thus USFWS used the best information available as of September 30, 2016, to create the map. Partners across the west are continuing to work together to gather data to inform future management decisions and to identify priority areas for monarch conservation actions.

SECTION 3.A. RANGE MAPS

3. A. 1. Full U.S. range map



3. A. 2. Western U.S. population map



SECTION 3.B. MONARCH POPULATIONS AND BREEDING

Table 2: Air Force lands within monarch population and breeding areas

Air Force lands	State	Monarch population in area	Breeding season	Notes
Altus AFB	OK	Eastern	Spring	None
Arnold AFB	TN	Eastern	Spring	None
Avon Park AFR	FL	Eastern	Spring	None
Badlands Bombing Range	SD	Eastern	Summer	None
Barksdale AFB	LA	Eastern	Spring	Located just outside fall migration area.
Barry Goldwater AFR	AZ	Western	Summer	None
Beale AFB	CA	Western	Summer	None
Bolling AFB	DC	Eastern	Spring	None
Brandywine Receiver Station	MD	Eastern	Spring	None
Brandywine Storage Annex/DRMO	MD	Eastern	Spring	None
Buckley AFB	CO	Eastern	Summer	None
Cannon AFB	NM	Contact zone between eastern and western	Spring	Located just outside fall migration area
Canyon Lake Recreational Area	TX	Eastern	Spring	None
Cape Canaveral Air Force Station	FL	Eastern	Spring	None
Cape Cod AS	MA	Eastern	Summer	None
Carter Creek	UT	Western	Summer	None
Claiborne Range	LA	Eastern	Spring	None
Columbus AFB	MS	Eastern	Spring	Located just outside fall migration area
Creech AFB	NV	Western	Summer	None
Davidsonville Transmitter Site	MD	Eastern	Spring	None
Davis-Monthan AFB	AZ	Western	Summer	None
Dover AFB	DE	Eastern	Summer	None
Dyess AFB	TX	Eastern	Spring	None
Edwards AFB	CA	Western	Summer	None

Air Force lands	State	Monarch population in area	Breeding season	Notes
Eglin AFB	FL	Eastern	Spring	None
Ellsworth AFB	SD	Eastern	Summer	None
Fairchild AFB	WA	Western	Summer	None
Farish Memorial Recreational Annex	CO	Eastern	Summer	None
Fort Fisher Recreation Area	NC	Eastern	Spring	None
Fort Tuthill	AZ	Western	Summer	None
Fourth Cliff Recreation Annex	MA	Eastern	Summer	None
Francis E. Warren AFB	WY	Eastern	Summer	None
Goodfellow AFB	TX	Eastern	Spring	None
Grand Bay Weapons Range	GA	Eastern	Spring	None
Grand Forks AFB	ND	Eastern	Summer	None
Griffiss AFB	NY	Eastern	Summer	None
Grissom AFB	IN	Eastern	Summer	None
Hanscom AFB	MA	Eastern	Summer	None
Hill AFB	UT	Western	Summer	None
Holloman AFB	NM	Contact zone between eastern and western	Summer	None
Hurlburt Field	FL	Eastern	Spring	None
Ipswich Antenna Farm Annex	MA	Eastern	Summer	None
JB-Andrews	MD	Eastern	Spring	None
JB-Charleston	SC	Eastern	Spring	None
JB-Charleston Naval Weapons Station	SC	Eastern	Spring	None
JB-Dix	NJ	Eastern	Summer	None
JB-Fort Eustis	VA	Eastern	Spring	None
JB-Lakehurst	NJ	Eastern	Summer	None
JB-Langley	VA	Eastern	Spring	None
JB-Lewis	WA	Western	Summer	None
JB-McChord	WA	Western	Summer	None
JB-McGuire	NJ	Eastern	Summer	None
JB-Naval Weapons Station (Short Stay)	SC	Eastern	Spring	None

Air Force lands	State	Monarch population in area	Breeding season	Notes
JBSA-Camp Bullis	TX	Eastern	Spring	None
JBSA-Fort Sam Houston	TX	Eastern	Spring	None
JBSA-Lackland	TX	Eastern	Spring	None
JBSA-Randolph AFB	TX	Eastern	Spring	None
Jonathan-Dickinson Missile Tracking Annex	FL	Florida non-migratory	Not applicable	None
Keesler AFB	MS	Eastern	Spring	None
Kirtland AFB	NM	Western	Summer	None
Laughlin AFB	TX	Eastern	Spring	Located just outside fall migration area
Little Rock AFB	AR	Eastern	Spring	None
Los Angeles AFB	CA	Western	Not applicable	Located in overwintering area
Luke AFB	AZ	Western	Summer	None
Macdill AFB	FL	Eastern	Spring	Located just outside non-migratory population area
Malabar Transmitter Annex	FL	Florida non-migratory	Not applicable	None
Malmstrom AFB	MT	Contact Zone between eastern and western	Summer	None
March AFB	CA	Western	Summer	Located on border of overwintering area
Maxwell AFB	AL	Eastern	Spring	None
McClellan AFB	CA	Western	Summer	None
McConnell AFB	KS	Eastern	Spring	None
Melrose AFR	NM	Eastern	Spring	None
Minot AFB	ND	Eastern	Summer	None
Moody AFB	GA	Eastern	Spring	None
Mountain Home AFB	ID	Western	Summer	None
Mountain Home AFB (Strike Dam Marina)	ID	Western	Summer	None
Nellis AFB	NV	Western	Summer	None
Nellis AFR	NV	Western	Summer	None
New Boston Air Station	NH	Eastern	Summer	None
Newport Test Annex	NY	Eastern	Summer	None

Air Force lands	State	Monarch population in area	Breeding season	Notes
Offutt AFB	NE	Eastern	Summer	None
Oscura Bombing Gunnery Range	NM	Contact Zone between eastern and western	Summer	None
Patrick AFB	FL	Florida non-migratory	Not Applicable	None
Peterson AFB	CO	Eastern	Summer	None
Poinsett Bombing and Target Range	SC	Eastern	Spring	None
Pope AFB	NC	Eastern	Spring	None
Robins AFB	GA	Eastern	Spring	None
Rome Laboratory	NY	Eastern	Summer	None
Sagamore Hill Elect Research	MA	Eastern	Summer	None
Saylor Creek Range	ID	Western	Summer	None
Schriever AFB	CO	Eastern	Summer	None
Scott AFB	IL	Eastern	Summer	None
Seguin Auxiliary Airfield	TX	Eastern	Spring	None
Seymour Johnson AFB	NC	Eastern	Spring	None
Shaw AFB	SC	Eastern	Spring	None
Sheppard AFB	TX	Eastern	Spring	None
Silver Mountain RRA	UT	Western	Summer	None
Stockbridge Test Annex	NY	Eastern	Summer	None
Sudbury Elec Research Annex	MA	Eastern	Summer	None
Tinker AFB	OK	Eastern	Spring	None
Travis AFB	CA	Western	Not applicable	Located just outside overwintering area
Tyndall AFB	FL	Eastern	Spring	None
U.S. Air Force Academy	CO	Eastern	Summer	None
Utah Test and Training Range	UT	Western	Summer	None
Utica Radar Site	NY	Eastern	Summer	None
Vance AFB	OK	Eastern	Spring	None

Air Force lands	State	Monarch population in area	Breeding season	Notes
Vandenberg AFB	CA	Western	Not applicable	Located in overwintering area
Verona Defense Fuel Support	NY	Eastern	Summer	None
Verona Test Annex	NY	Eastern	Summer	None
Whiteman AFB	MO	Eastern	Summer	None
Wright-Patterson AFB	OH	Eastern	Summer	None

Table 3: Milkweed suitability and monarch presence in the west²

Air Force lands	State	Milkweed Suitability	Monarch presence	Notes
Barry M. Goldwater Range	AZ	Low	No	None
Beale AFB	CA	Medium/High	No	None
Carter Creek	UT	No data	No	None
Creech AFB	NV	Low	No	None
Davis-Monthan AFB	AZ	Low/Medium	Nearby	None
Edwards AFB	CA	Low	No	None
Fairchild AFB	WA	Medium	No	None
Fort Tuthill	AZ	Medium/High	No	None
Hill AFB	UT	Medium/High	No	None
Los Angeles AFB	CA	Medium/High	Nearby	Located in overwintering zone
Luke AFB	AZ	Low/Medium	No	None
March AFB	CA	Medium	No	Located on border of overwintering zone
McClellan AFB	CA	Medium/High	Nearby	None
Mountain Home AFB	ID	Medium	No	None
Mountain Home AFB (Strike Dam Marina)	ID	Medium/High	No	None
Nellis AFB	NV	Low/Medium	No	None
Nellis AFR	NV	Low/Medium	No	None
Saylor Creek Bombing Range	ID	Medium	No	None
Silver Mountain RRA	UT	Low/Medium	No	None
Travis AFB	CA	Medium/High	Nearby	Located just outside overwintering zone
Utah Test And Training Range	UT	Low	No	None
Vandenberg AFB	CA	Medium	No	Located in overwintering zone

² Based on Western U.S. population map. Data was divided into five milkweed suitability classes using the Standard Deviation classification method in ArcMap. Occurrences were excluded from the analysis if the location was considered to be of unknown or poor quality. “Nearby” is defined as reports within five miles.

SECTION 3.C. SPECIES PROFILE



L: [Adult monarch butterfly on showy milkweed](#) (photo: Tom Koerner/USFWS [CC BY 2.0](#)); **R:** [Monarch larva on milkweed leaf](#) (photo: Rick Hanson/USFWS)

Status: Petitioned for listing under the ESA.

Life cycle: An adult female monarch butterfly lays eggs on milkweed plants. The egg hatches as a larva in approximately four days. The larva matures in 9 to 14 days while going through five instars, then seeks a sheltered spot and turns into a pupa. After 9 to 15 days an adult butterfly ecloses from the pupal case. Monarchs have four to five reproductive generations per year. Adults in the summer generations live two to five weeks, mating when three to eight days old. Adults in the migratory (overwintering) generation may live up to nine months, but do not mate and lay eggs until the following spring. Adults may mate multiple times.

Floral preferences: Adults use a wide variety of flowering plants throughout migration and breeding. Important nectar sources during the spring migration typically include *Coreopsis spp.*, *Viburnum spp.*, *Phlox spp.*, and, early blooming milkweeds. Important nectar sources during fall migration include: goldenrods (*Solidago spp.*), asters (*Symphyotrichum spp.* and *Eurybia spp.*), gayfeathers (*Liatris spp.*), and coneflowers (*Echinacea spp.*) in the north and frostweed (*Verbesina virginica*) in Texas. Cultivated alfalfa, clover, and sunflower also are important resources in Texas. Other important nectar sources include: willow (*Salix sp.*), sunflower (*Helianthus spp.*), thistle (*Cirsium spp.*) and sage (*Salvia spp.*). Lists of preferred nectar plants by region specific to monarchs can be found at <http://www.xerces.org/monarch-nectar-plants/>.

Adult food: Nectar from many flowering plants.

Juvenile food: Many species of milkweed (*Asclepias*). Refer to Table 4 for recommended milkweeds for monarch breeding areas.

Habitat: Breeding: open areas, especially moist valley bottoms and meadows. See below for overwintering habitat.

Nesting sites: None; eggs are laid directly on milkweed plants.

Breeding dates: March through August.

Overwintering sites: Eastern population (east of Rockies): Mature trees in oyamel fir forests in mountains of central Mexico. Western population (west of Rockies): Among eucalyptus trees (*Eucalyptus globulus*), Monterey pines (*Pinus radiata*), and/or Monterey cypress (*Cupressus macrocarpa*) from Mendocino County, CA, to Baja, CA, and Mexico. Found in areas usually within 2.4 km of CA coast that are cool (but above freezing), sheltered from wind, with a moisture source and exposure to filtered sunlight. The lower slopes of valleys, bays and inlets support larger numbers. Some overwinter in Mexico.

Migration dates: The eastern population moves north in March, and south from August to November. The western population travels inland to breeding areas from February to March and moves to overwintering sites from September to November.

Threats:

1. Loss and degradation of breeding and migration habitat, especially milkweed and nectar plants
2. Herbicides and insecticides, including neonicotinoids and genetically modified herbicide resistant crops and associated herbicide use
3. Climatic events and climate change
4. Logging or development at overwintering sites in Mexico
5. Loss and degradation of western population overwintering habitat (i.e., tree loss and alteration due to grove senescence and inappropriate management practices, lacking proximal nectar sources; and
6. Parasites

Management recommendations:

1. Adjust timing of mowing to not interfere with monarch breeding or nectaring along the migration route. Overall, late winter mowing is best. For additional details, see: <http://monarchjointventure.org/images/uploads/documents/MowingForMonarchs.pdf>
2. Plant native flowering plants so nectar is available during the times monarchs are present in the area.
3. Plant locally appropriate milkweed (*Asclepias* spp.) if within breeding range and known historic locations in the western U.S. See Table 4.
4. Eliminate or reduce the use of pesticides. Insecticides can result in direct mortality to monarchs and herbicides can eliminate needed host and nectar plants. If pesticides are used, select pesticides that are specific to the pest; time applications to avoid monarch activity periods; establish buffers; and minimize drift to non-target areas by direct ground application. See Section 3 of the *Reference Guide* for additional details on pest management.
5. Maintain open, sunny habitat patches where native flowering plants thrive. Make sure mowing or other management is timed so not to interfere with breeding or migration.
6. Eliminate invasive plants and nonnative tropical milkweed (*Asclepias curassavica*), which is believed to promote the spread of disease (e.g., *Ophryocystis elektroscirrha*) in migratory monarchs.
7. If an area is grazed, control amount of grazing to avoid eliminating flowering plants and reduce soil compaction.

8. Conduct prescribed burns when monarchs are absent from the habitat, when possible. Leave unburned patches (at least one-third the area of the proposed burn footprint) that provide refugia (nectar and breeding sites) for butterflies that can then re-colonize the burned area the next season.
9. Reduce human disturbance at overwintering sites when monarchs are present.
10. For western population: Avoid tree removal and tree trimming at monarch overwintering sites unless trees pose a human health and safety risk. Develop long-term management plans at overwintering sites that include (in many instances) the planting of native trees and nectar plants.
11. For western population: Consult with a monarch expert and an arborist prior to any cutting or thinning within tree stands known to support overwintering monarchs. Schedule tree thinning or cutting outside of the November to February overwintering season.

Additional information: Monarchs need nighttime roosting sites during migration. For western population: Roosting generally occurs in both native and nonnative deciduous and evergreen trees. Narrow-leaved tree species such as willows, Russian olives, locusts, pines, and eucalyptus are documented as roosting sites.

Current information on the monarch butterfly from USFWS can be found at:
<https://www.fws.gov/savethemonarch/>

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[Butterfly weed](#) (*A. tuberosa*) (photo: Jessica Piispanen/USFWS [CC BY 2.0](#))

Table 4: Recommended milkweeds for monarch breeding areas

Milkweed species in this table are known to be used by monarch larvae in the indicated regions (although they may also be found in other regions).

Scientific Name	Common name	Notes	No. East	TX, OK	So. East	West	AZ	CA
<i>Asclepias angustifolia</i>	Arizona milkweed	riparian areas and canyons	No	No	No	No	Yes	No
<i>A. asperula</i>	Antelopehorns milkweed	desert and sandy areas	No	Yes	No	Yes	Yes	No
<i>A. californica</i>	California milkweed	grassy areas	No	No	No	No	No	Yes
<i>A. cordifolia</i>	Heartleaf milkweed	rocky slopes	No	No	No	Yes	No	Yes
<i>A. eriocarpa</i>	Woolly pod milkweed	clay soils and dry areas	No	No	No	No	No	Yes
<i>A. erosa</i>	Desert milkweed	desert regions	No	No	No	Yes	No	Yes
<i>A. exaltata</i>	Poke milkweed	woodland areas; not in NE, KS, MO, ND, SD	Yes	No	No	No	No	No
<i>A. fascicularis</i>	Mexican whorled milkweed	dry climates and plains; not in CO, UT, NM and AZ	No	No	No	Yes	No	Yes
<i>A. humistrata</i>	Sandhill/Pinewoods milkweed	dry sandy areas and soils; only in parts of FL	No	No	Yes	No	No	No
<i>A. incarnata</i>	Swamp milkweed	damp, marshy areas	Yes	No	No	No	No	No
<i>A. oenotheroides</i>	Zizotes milkweed	sandy/rocky prairies and fields	No	Yes	No	No	No	No
<i>A. perennis</i>	Aquatic milkweed	hydrated soils	No	No	Yes	No	No	No
<i>A. speciosa</i>	Showy milkweed	savannahs and prairies	No	No	No	Yes	No	Yes

Scientific Name	Common name	Notes	No. East	TX, OK	So. East	West	AZ	CA
<i>A. subulata</i>	Rush milkweed	desert areas	No	No	No	No	No	No
<i>A. syriaca</i>	Common milkweed	well-drained soils	Yes	No	No	No	No	No
<i>A. tuberosa</i>	Butterfly weed	well-drained soils	Yes	No	Yes	No	Yes	No
<i>A. variegata</i>	White milkweed	thickets and woodlands	No	No	Yes	No	No	No
<i>A. verticillata</i>	Whorled milkweed	prairies and open areas	Yes	No	Yes	No	No	No
<i>A. vestita</i>	Woolly milkweed	dry deserts and plains	No	No	No	No	No	Yes
<i>A. viridis</i>	Green antelopehorn milkweed	dry areas and prairies	No	Yes	No	No	No	No

No. East = States east of the 100 meridian; So. East = AR, TN, NC and states south; West= States west of the 100 meridian.

Source: Adapted from Monarch Joint Venture. [Plant milkweed for monarchs](#), Factsheet, 2 pp., accessed on web, 2016.